APP #	TITLE	BUDGET REQ	FUND	SCORE (MEDIAN)	Mean	SD	Low	High	Y	N
EDUC2-12617	Bridges to Stem Cell Research Internship Program	$3,606,500	Y	97	97	2	94	100	15	0
EDUC2-12620	CIRM Bridges 3.0	$3,605,495	Y	95	93	2	89	95	15	0
EDUC2-12718	CIRM Bridges3.0 Stem Cell Research & Therapy Training Program	$3,606,500	Y	95	92	4	85	95	15	0
EDUC2-12691	Strengthening the Pipeline of Master's-level Scientific and Laboratory Personnel in Stem Cell Research	$2,946,500	Y	92	91	3	83	95	14	1
EDUC2-12693	CIRM Bridges Science Master's Program	$3,606,500	Y	90	91	2	90	95	14	0
EDUC2-12607	Bridges to Stem Cell Research and Therapy	$3,605,500	Y	90	90	3	85	98	15	0
EDUC2-12611	CIRM Bridges to Stem Cell Research and Therapy Training Grant	$3,606,500	Y	90	90	2	85	95	15	0
EDUC2-12720	Stem Cell Scholars: a workforce development pipeline, educating, training and engaging students from basic research to clinical translation.	$3,606,500	Y	90	90	1	90	92	15	0
EDUC2-12677	Stem Cell Internships in Laboratory-based Learning (SCILL) continue to expand the scientific workforce for stem cells research and therapies.	$3,606,500	Y	90	90	3	85	95	14	0
EDUC2-12726	Training Masters Students to Advance the Regenerative Medicine Field	$3,276,500	Y	89	88	3	80	90	14	1
EDUC2-12638	CIRM Regenerative Medicine and Stem Cell Research Biotechnology Training Program	$3,276,500	Y	88	88	2	85	90	15	0
EDUC2-12734	Bridges to Stem Cell Research and Therapy: A Talent Development Program for Training Diverse Undergraduates for Careers in Regenerative Medicine	$3,606,500	Y	88	87	3	80	90	14	1
EDUC2-12695	CIRM Graduate Student Training in Stem Cell Sciences in the Stem Cell Technology and Lab Management Emphasis of the MS Biotechnology Program	$3,606,500	Y	85	85	1	85	88	15	0
EDUC2-12730	Building Career Pathways into Stem Cell Research and Therapy Development	$2,706,200	Y	85	85	3	80	90	12	2
EDUC2-12738	CIRM Bridges to Stem Cell Research and Therapy	$2,806,896	N	80	79	4	70	87	1	14

Application #	EDUC2-12617
Title (as written by the applicant)	Bridges to Stem Cell Research Internship Program
Abstract (as written by the applicant)	The Bridges to Stem Cell Research Internship Program will build upon the past success of our ongoing Internship Program which has significantly expanded the pool of personnel with the expertise necessary to undertake careers in regenerative medicine. Highly competitive trainees will be recruited from the university's diverse student populations, which include individuals from socio-economically disadvantaged communities, to attain essential expertise in regenerative medicine. A highly optimized curriculum for Trainees at the home institution includes a regulatory affairs course providing information about healthcare product regulation and development, a stem cell journal club course, colloquia and community outreach activities designed to provide students with educational and patient engagement opportunities, and participation in a biomedical ethics course. Trainees will complete a comprehensive, externally-provided laboratory training course which includes hands-on maintenance and characterization of induced pluripotent stem cells within a state-of-the-art Training Center designed by noted experts in the field. Trainees will complete a 12-month internship experience at one of four partnering stem cell research institutions located nearby, or at local biotechnology companies specializing in human stem cell research and development. During the internship period, Trainees will attend research seminars, meet and present their scientific progress at monthly colloquia with other trainees and participating host mentors and scientists, and present scientific posters encompassing their data at local and regional scientific meetings. The proposed program will also include a Diversity, Equity and Inclusion Plan to ensure diverse inclusive perspectives and personal experiences during the implementation of the program, and ensure outreach and recruitment of qualified persons for training who are representative of the diverse and different socio-economic backgrounds in the California population. The culmination of the training program will include a written thesis and oral thesis defense for graduate-level trainees, a final Poster Presentation Symposium, and participation at the Annual CIRM Bridges Meeting. The training program will enable students of diverse background to contribute their knowledge and technical skills developed upon completion of the training period to the great promise of stem cell-based treatment therapies for patients.
Statement of Benefit to California (as written by the applicant)	Stem cell-based treatment strategies represent the future of medicine for patients with unmet medical needs. Continued progress in the development and administration of these new therapies not only require ongoing basic and translational research, but also a sustainable approach whereby the next generation of scientists and technicians build upon the initial success of previous scientific accomplishments. The continuation of our ongoing training program will contribute to the generation of knowledgeable and well-trained scientists and technicians by providing hands-on research experiences in combination with rigorous academic curricula. The internship has been carefully crafted to increase the number of young investigators and technicians with varied career goals by recruiting students representing California's diverse population who can contribute to the development of stem cell based therapies and accelerate their eventual delivery to patients benefiting by these powerful new approaches.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 97

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	97
Median	97
Standard Deviation	2
Highest	100
Lowest	94
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- Program was previously established and so far successful; includes both course work and hands-on work through internship; training and Internship in both academia and industry; well set up mentorship program; previous research experience is required and demonstrated to improve outcomes of the program.
- This is a well-designed program that will have a strong impact on producing trainees with excellent stem cell expertise.
- Quality institution and substantial opportunity for interaction with biotech opportunities.
- Includes activities for interactions with patients and community outreach.
- Program was previously established and successful in recruiting diverse students; outreach and recruitment of qualified persons for training who are representative of the diverse and different socio-economic backgrounds in the California population. Program will contribute to the generation of knowledgeable and well-trained scientists and technicians with varied career goals who can contribute to the development of stem cell based therapies and accelerate their delivery to patients benefiting by these powerful new approaches.
- The impact is demonstrated by report of successful placement of previous trainees.
- None of the described activities will especially address "unmet needs" of patients.

Is the proposal well planned and designed?

- A strength of the program is the inclusion of internships in both academia and industry. 12-month internship experience at one of four partnering stem cell research institutions located nearby, or at local biotechnology companies specializing in human stem cell research and development.
- Internship placement is based on the list of abstracts from the potential host mentors, Mentor Mixer Event, and interview in labs to determine if the project is appropriate for them and if the lab will be a "good fit" for them.
- Program evaluation continual throughout the year and discussed at each Advisory Committee meeting.
- Preparation of an extensive internship manual is a notable strength and very student centered.
- A notable opportunity for students is the Ethics course and the course in Regulatory Affairs providing insights for successful translation for novel stem-cell based therapies into the clinic.
- The design is quite strong. The inclusion of an ethics course is a nice touch.
- Notable strength in integrating various goals (research, patient interactions, career development) into one event which helps with intern's time management and increases the coherence of the various program components.
- A model program.
- Good patient engagement.
- Colloquia and community outreach activities designed to provide students with educational and patient engagement opportunities.

- Students mentored on a regular basis by their faculty mentor and host institution mentors, as well as the Program Director and Program Coordinator.
- Notable strength in mentor training.
- Works closely with multiple organizations to specifically recruit underrepresented students.
- College of Sciences at the institution provides a Diversity, Equity, and Inclusion Plan. The institution is one of the nation's top colleges recognized for the diversity and overall success of underrepresented students and students first in their family to attend college.
- Trainees participate for one semester in the Identity & Allyship Awareness Course and attend once a month in the Society for the Advancement of Biology Education Research (SABER) Zoom Seminar series.
- Trainee progress is tracked through annual follow up survey to ascertain their employment and/or education status, as well as their continued work in the stem cell field.
- Letters of support from previous trainees are a strength.
- Outstanding program director with a ton of experience.
- Professionally done.
- Course work is limited and does not include bioengineering courses.

Is the program proposal practical and achievable?

- Outstanding overall program.
- Resources are adequate; personnel is adequate; partnerships with both industry and academia and mentors with different stem cell-focused expertise; intensive hands-on course in stem cell techniques at one of three nationally recognized training centers.
- Excellent course work and an excellent control group to evaluate the value of the course work.
- Well designed regulatory course.
- The level of organization is strong.
- The Program Director has committed 54% effort in support of the program and has personally mentored the transitioning of 37 past trainees.
- Program Director for the CIRM Stem Cell Traineeship Program for the past ten years is a strength; PD will commit 54% time to lead and coordinate the proposed training program.
- Advisory Committee identified and will meet three times a year to address the effectiveness of the Training Program in several areas.
- Recruitment of diverse students and individuals from socio-economically disadvantaged communities is a strength.
- The program has more competitive applicants than trainee positions they can offer, and the criteria for student selection is clearly outlined and reviewed by three Selection Committee members.
- Previous host mentors say that students from the institution stand out (letters) as exceptionally well prepared based on their previous research experience.
- program availability advertised to the students through a variety of methods (posters, class visitations, program web page, e-mail, advising sessions);
- Recruitment from underrepresented groups accomplished through collaboration with their existing NIH funded research preparation programs, as well as university-sponsored groups.
- Good tracking of student progress.
- Strong letter of support was provided by the institution's Dean of the College of Science.
- There is strong support from the University.
- Institutional commitment documented by a letter of support by Dean and Professor of Chemistry
- Strong institutional support.

Has the track record and outcomes of a prior training program demonstrated success?

- This is a very well-developed proposal that builds on the strengths already in place from the previous funding period.
- There is a well-considered and executed diversity, equity and inclusion plan demonstrated by report of 53% of trainees representing underrepresented groups.
- This is based on a previous successful training grant. The tracking and diversity programs are superlative.
- Prior training program was successful; 119 students have successfully completed the program over an eleven year period.
- Graduation rate of trainees is 30% higher than the average graduation rate of the campus as a whole.
- Track record is outstanding.
- Good tracking of program graduates.
- Excellent reporting detail on outcomes.

Application #	EDUC2-12620
Title (as written by the applicant)	CIRM Bridges 3.0
Abstract (as written by the applicant)	In 2004 the people of California, recognizing the significance and potential of stem cell therapies for the treatment of many diseases including degenerative diseases like Alzheimer's disease and macular degeneration, to cancer and even heart disease, passed proposition 71 to fund stem cell research and the development of stem cell therapies. The California Institute of Regenerative Medicine (CIRM) was established to manage the funds, plan and execute programs that would facilitate the development of stem cell therapies. Recognizing the need for a large workforce in stem cell research for the development of stem cell therapies, the initial phase of the program was focused on research and training of individuals in stem cell fields. These efforts have resulted in a substantial increase in the number of scientists and technically trained individuals in the field of stem cell biology and, more importantly, an increase in the number of laboratories and biotechnology industries focused on stem cell research and regenerative medicine in California. In 2020, the people of California passed Proposition 14 to continue to develop treatments, advance clinical trials and achieve new scientific breakthroughs for California's patients with unmet medical needs. Our CIRM Bridges 3.0 program will produce 50 well-trained and "ready-to-start" laboratory professionals committed to accelerating the discovery, development and delivery of stem cell, gene therapy and related technologies for improving human health. Each year we will select a diverse cohort of 10 highly motivated and well prepared trainees to participate in a yearlong internship in regenerative medicine at our collaborating host institutions located across California. In addition to engaging in extensive laboratory research, these CIRM Bridges 3.0 trainees will receive advanced training in the research methods and good manufacturing practices required to develop cellular- based therapies for unmet medical needs. They will educate our rural, medically underserved community about regenerative medicine and gain awareness of socio-economic issues and disparities around health care and access. Throughout the duration of the 12 month internship, they will receive personalized career counseling so they are poised to enter the workforce upon completion of the program.
Statement of Benefit to California (as written by the applicant)	The substantial investment of funds by the people of California in stem cell biology and regenerative medicine through Proposition 14 will continue to develop treatments, advance clinical trials and achieve new scientific breakthroughs for California's patients with cancer, diabetes, heart disease, Alzheimer's, Parkinson's, HIV/AIDS, ALS, MS, sickle cell disease, lung diseases, kidney disease, bubble baby disease (ADA-SCID), age-related blindness such as macular degeneration and genetic blindness, epilepsy, stroke, schizophrenia, autism, other mental health and brain conditions, and even infectious diseases like COVID-19. As the first chairperson of the California Institute for Regenerative Medicine Robert Klien stated, "This medical revolution holds the promise of restoring health and quality of life for many of California's individuals and families suffering from chronic disease and injury. However, the last tactical mile to bring this broad spectrum of therapies to patients will require more funding and the thoughtful support of California's public as the human trials and discoveries are refined and tested, overcome numerous obstacles or complications, and ultimately serve to improve the life and reduce the suffering of every one of us." The CIRM 3.0 Bridges Training Program will develop a workforce technically trained in stem cell and regenerative medicine able to meet these challenges. It will build upon our tremendously successful program history that has attracted nearly 100 talented young people to a field that is responsible for 92 FDA-Approved clinical trials and thousands of discoveries. We have designed our CIRM 3.0 Bridges training program to provide students from diverse backgrounds with training in stem cell and regenerative medicine and a good understanding of the needs of patients with potential for stem cell therapies. They will also be educated with regard to the regulatory process and ethical issues. The development of such a workforce is critical for the future success of the field of stem cell and regenerative medicine, and CIRM 3.0 will have tremendous impact on the present and future economy of the state of California.
Funds Requested	$3,605,495
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation

	of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 95

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	93
Median	95
Standard Deviation	2
Highest	95
Lowest	89
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- The program has an impressive track record in training successful students.
- Past programs have successfully transitioned 89% of trainees into stem-cell related fields.
- Great overall plan to foster commitment to stem cell research.
- Well-organized program with significant impact.
- Good geographical diversity.
- Surmounted geographical isolation in developing a sound program.
- Great DEI plan.
- Strong team with well defined responsibilities.

Is the proposal well planned and designed?

- The program has an impressive plan where they used co-PIs to lead efforts on the program.
- Have made changes over the course of the program including better outreach, better patient engagement, and new courses for students.
- Outcomes suggest appropriateness of the program.
- Good distribution of leadership roles across multiple faculty, each taking responsibility for a different key component of the program.
- The program has expanded based on past programs identifying additional areas of importance including the the GxP bundle from the Regulatory Affairs Professional Society and the bioinformatics workshop.
- GLP and regulatory training.
- Good practical preparation in regulatory, GMP, GLP.

- The new immersion course is a great addition.
- Bioinformatics course.
- A notable strength is the involvement of former trainees as advisors/mentors for current trainees.
- Strong diversity, strong alumni support, good institutional support.
- Partnership with both academic institutions and biotechs.
- Successfully overcomes geographic difficulty in internship.
- Mandatory patient engagement.
- Good trainee assessment.
- A minor concern is that the mentoring plan lacks detail.
- Some minor questions about mentoring.
- Mentoring program not detailed.

Is the program proposal practical and achievable?

- A notable distinguishing feature of the program is the assignment of "key persons" with specific responsibilities for supporting students throughout their program.
- Devoted personnel for each initiative.
- Yes, the program has major successes.
- Clearcut design, strong DEI plan.
- Good partner institutions.
- Distance between institution and partners mean mentorship will require careful management.
- No concerns.

Has the track record and outcomes of a prior training program demonstrated success?

- The program has implemented and has demonstrated success in training underrepresented groups. The diversity, equity and inclusion plan is exceptional.
- The program has an impressive track record.
- Long history of training.
- Excellent track record.
- Good track record in DEI.
- No concerns.

Application #	EDUC2-12718
Title (as written by the applicant)	CIRM Bridges3.0 Stem Cell Research & Therapy Training Program
Abstract (as written by the applicant)	The main focus of the CIRM Bridges3.0 Stem Cell Research & Therapy Training Program is heavily weighted on goal-oriented practical laboratory training experience in stem cell biology and stem cell-based patient therapies. Our program is integrated with educational, ethical, and guidance features for highly qualified and culturally diverse senior undergraduate students. Our internship-host institution provides mentors who are world-leaders in fundamental stem cell research and therapeutic translational applications. There is a great diversity of available hands-on training environments in human and mouse embryonic and adult or cell type-specific stem cell biology, spanning the basic to translational investigative spectrum. Our partnership achieves all of the major Bridges Program objectives including: 1) training laboratory personnel in current stem cell research techniques, policy, and ethics, 2) introducing community outreach, patient advocacy, and career counseling for future stem cell-based therapies, and 3) facilitating the entry of an ethnically and culturally diverse student population into the emerging world of stem cell biology and regenerative medicine. Our training program will provide CIRM trainees with opportunities to study the latest advances in stem cell biology, to present their own work in settings in which they can obtain constructive feedback, to interact with their peers in formal and informal forums, to meet leaders in the field, to interact with patients, and to develop their career potential through advisement and mentoring. CIRM internships at our host institution will be 12 months in duration for undergraduate students in screened and selected labs and will be preceded by intensive training at our institution and at Pathways to Stem Cell Science. The majority of intern time will be spent on laboratory research. Trainees will be taught stem cell and essential analysis techniques such as microscopy, cell sorting, and good laboratory practices (GLP) in the internship-host lab and affiliated cores. Their projects will be discussed and chosen in partnership with the lab mentor, who will pair trainees with more advanced senior graduate or post-doctoral students working in the area of the trainee's project. This hands-on experience will be supplemented by participation in weekly research work in progress meetings, attendance at the weekly stem cell seminar series, attendance at Regional, National, and International Stem Cell Symposia, by career counseling, community outreach, patient advocacy, and by formal and informal mentoring by home and host-institution faculty. A major purpose of our inter-institutional training program is to provide an opportunity for engaged, interested, and successful trainees to gain the necessary skills and qualifications to springboard into careers in stem cell research that spans the spectrum, from basic studies to translational approaches to stem cell-based patient therapies, in academia and industry.
Statement of Benefit to California (as written by the applicant)	With the substantial amount of spending in connection with its operations, our institution has immense economic, fiscal, and social impacts far beyond the local community. Our institution has an overall economic impact of nearly $1.9. Economic output generated by our institution-related spending generated nearly $677.6 million in increased wages and earnings, raising labor income across the state. Of the total labor income generated, $588.6 million landed in the county. The additional income generated by our institution-related expenditures was largely spent within the local economy, which together with the increased demand for labor driven by these expenditures, resulted in a cumulative total of 11,774 jobs supported across all industries in California. Of these new jobs, 10,369 originated in our county. Our institution employees provided added value to state and local governments in the form of increased tax revenue at a total of $122.1 million. Our trainees will have a tangible health and economic impact on California, its academic institutions, and its biotechnology, pharmaceutical, and stem cell companies, and the rest of the nation as California and its people move forward with personalized medicine during the 21st century. Our host institution is an economic powerhouse for our local areas, surrounding areas, and California overall. Our host institution generated a total of $11.06 billion in economic activity and supported more than 72,700 full-time jobs throughout the state during the 2016–17 fiscal year. With more than 45,000 students and 43,000 employees, our host institution is renowned around the world for the quality of its students and faculty, and its dedication to its mission of research, teaching and service. During the 2016-17 fiscal year, our host institution faculty received over $1.06 billion in sponsored research funding. Our host institution is consistently ranked each year as one of the best universities in the United States, including as the No. 1 public University in the Nation by U.S. News & World Report and as No.1 among best-value universities by Forbes. Approximately 259 licensed companies have been created based on the

	technology developed at our host institution. An active portfolio of approximately 3,000 inventions and more than 1000 patents reflects clearly that our host institution plays a central role in shaping our world.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 95

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	92
Median	95
Standard Deviation	4
Highest	95
Lowest	85
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	15	0
Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- The record of this program supports the idea that the program will produce well-trained individuals for research in stem-cells especially in academia, but also industry.
- The pool of potential applicants generally reflects the demographics of California. Based on the outcomes of the last 11 years, the demographics of the graduates of the program also approximately reflect state demographics.
- The project has a strong formal education program, which begins with laboratory course completion requirements for candidate eligibility and includes courses during a year-long internship [ ]. As a result, trainees are very well prepared to have a successful internship experience.
- Yes, the program has a history of success.

Is the proposal well planned and designed?

- The program appears to support all of the major Bridges Program objectives including: training laboratory personnel in current stem cell research techniques, policy, and ethics; promoting community outreach, patient advocacy, and career counseling for future stem cell-based therapies; and introducing an ethnically and culturally diverse student population to stem cell biology and regenerative medicine.

- The program will provide CIRM trainees with the latest advances in stem cell biology, to present their own work in which they can obtain constructive feedback, to interact with their peers in formal and informal forums, to meet leaders in the field, to interact with patients, and to develop their career potential through appropriate mentoring.
- The program had detailed courses that were integrated throughout the training program that will lead to the successful training of students.
- Strong outreach.
- Host research institution offers great internship opportunities.
- Involvement of local research university for training.
- The core curriculum is good. Involvement with the research university for internships is strong.
- Not clear which courses they are required to complete while attending the internship; students need to add one extra semester.
- Too much overlap of coursework and internship.
- It is concerning that the trainees' time in college is likely increased by participation in the internship. The program could implement a program that does not delay graduation.

Is the program proposal practical and achievable?

- The program is a laboratory training experience in stem cell biology and regenerative medicine, with appropriate educational goals, outreach, patient advocacy, mentored guidance, and career counseling for culturally diverse undergraduate students. The host laboratories provide an opportunity for hands-on scientific experience in hESC, adult stem cell, cancer stem cell, and iPSC biology.
- The program had a clearly defined set of goals that were described in the program.
- The program has strong leadership and provides students access to world class research labs.
- There are some concerns about access of students to research university resources.

Has the track record and outcomes of a prior training program demonstrated success?

- The program is very successful.
- Successful program who trained 100 students but students are senior and more likely to succeed.
- Successful in recruiting diverse students.
- Good training outcomes.
- Previous successes with diversity recruitment are good.
- The last four years have shown an increase in recruitment to 44% Latinx trainees (15 of 35 trainees are Latinx).
- The program has achieved 100% successful completion of the traineeship, but the demographics of the trainees do not reflect that of the institution.

Application #	EDUC2-12691
Title (as written by the applicant)	Strengthening the Pipeline of Master's-level Scientific and Laboratory Personnel in Stem Cell Research
Abstract (as written by the applicant)	The applicant institution will partner with a CIRM Major Facility to create a comprehensive program that will produce 50 master's degree graduates with the scientific foundation, research experience, and laboratory skills to pursue careers in stem cell research. Graduates of the Stem Cell Master's Program will develop knowledge and skills required for basic research, as well as its translation into clinical applications. Rather than a traditional, independent master's thesis project, students will engage in activities specifically intended to improve their professional preparation for laboratory careers in applied biosciences. This will enable our graduates to help fill the high demand for research-support professionals in a growing number of laboratories devoted to stem cell research and translation to the clinic. This program builds upon curricular strengths at the applicant institution and the outstanding research facilities of the CIRM Major Facility located nearby. The twenty-month program consists of graduate courses and a research internship. During the eight-month research internship, students work with mentors as part of disease teams that bring students and research scientists together with clinicians to work toward cellular therapy trials. Students will also receive advanced training during a week-long Stem Cell Culture Techniques Course at the CIRM Major Facility. Education enhancement and professional development activities will include a course in Good Manufacturing Practice (GMP) at the CIRM Major Facility, and the Bench-to-Bedside Seminar Series at the applicant institution featuring speakers from renowned laboratories, patient advocacy groups and community healthcare facilities. The program will emphasize community engagement through various mechanisms, including the dissemination of a student-authored stem cell blog featuring Bridges student research of CIRM Bridges students, as well as the Regenerative Medicine Lecture Series—a community lecture featuring prominent stem cell scientists— hosted by the applicant institution twice per calendar year. The applicant institution has considerable potential to attract students from underserved populations. The program will be advertised to students throughout California, with an emphasis on minority-serving institutions and programs, like the Louis Stokes Alliance for Minority Participation Program and the Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS). With a combination of research and professional skills, graduates will fill roles vital to furthering the progress of regenerative medicine. Graduates experienced in team-based research and GMP will have high potential for career advancement, transitioning easily beyond entry-level positions or into doctoral programs. Our program aims to both broaden participation in regenerative medicine and to enhance the development of novel stem cell-based therapies.
Statement of Benefit to California (as written by the applicant)	CIRM's funding and training institutions play a critical role in accelerating the rate at which qualified members join the field of stem cell research which, in turn, accelerates the rate at which human stem cell treatments and cures begin mending the current untreatable diseases that plague the population of California and the world beyond. Over the last 11 years, the CIRM Bridges students interning at laboratories within the Stem Cell Master's Program have significantly contributed to the development of stem cell science currently being translated into clinical applications for devastating disorders such as Huntington's disease, critical limb ischemia, non-healing diabetic ulcers, liver disease, kidney and bladder disease, HIV and epidermolysis bullosa. With this established track record, it is anticipated that the new Bridges students will have their own major impact in our stem cell laboratories, furthering the clinical translation of current stem cell applications. In addition to their technical training, students will become well-versed in new approaches to patient care, including how to effectively and compassionately communicate with patients about relevant stem cell therapies. With their specialized and focused education, it is expected that CIRM Bridges students will become leaders in biomedical fields and industry as stem cell applications become commercialized therapies that routinely benefit patients in the exciting field of regenerative medicine in healthcare.

	Of previous CIRM Bridges students who have graduated from the Master's Program, the vast majority are currently working within the biomedical sector or are in PhD programs in California, indicating a long-term benefit to the regional STEM workforce. With our increased recruitment efforts centered on students from historically underrepresented groups and the addition of equity-centered inclusive training practices, our program also aims to increase the diversity of California's biomedical workforce.
Funds Requested	$2,946,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 92

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	91
Median	92
Standard Deviation	3
Highest	95
Lowest	83
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	14
(1-84): Not recommended for funding	1

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	13	1
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	13	1

Does the proposal have the necessary significance and potential for impact?

- The stem cell concentration has seven core intro courses. The seven courses are focused on research methods, cellular, molecular and development biology. This is coordinated and integrated with the advanced laboratory internship.
- Students will receive hands-on training in numerous laboratory techniques ordered for stem cell research.
- One of the attractions is the 14 hour theoretical and practical laboratory course in stem cell biology and good manufacturing practice.
- One of the major components of the outreach program is writing on the stem cell research blog, giving students still additional experience. They also will deliver presentations to high school and community college students in the

region. There will also be virtual seminars for high school and community college students outside of the broader region within California.
- Strong approach to DEI.
- Yes. The impact should be good.

Is the proposal well planned and designed?

- There is an excellent recruitment plan for diverse students. In addition, the coordinator to place students into internships should be effective.
- The institution will partner with one of CIRM major facilities to create a comprehensive program that will produce 50 Masters degree graduates with the scientific foundation to pursue careers in stem cell research. Rather than a traditional independent master's thesis project, students will engage in activities that are designed to improve their professional preparation for laboratory careers and deployed biosciences.
- The program builds upon the curriculum strengths at the institution and the outstanding research facilities at the internship laboratories.
- Very well designed and has a good track record.
- Well-constructed curriculum.
- 15-week bench to bedside seminars is a strength.
- Bench to bedside course is excellent.
- Outreach programs are good.
- One person dedicated to internship placement.
- The academic mentoring of the students is very well thought out, with attention to each stage of this process.
- Blog initiative is a strength but its success should be tracked by metrics.
- Blogs are no longer cool. I recommend finding something else to do and measure how effective it is. If you must do blogs, perhaps try "Medium" which allows you to track statistics on readership. How can you measure the impact of the method of outreach and scientific writing? You could also consider editing Wikipedia articles, for example.
- The proposal does not make a good case for why the internships are only 8 months long.

Is the program proposal practical and achievable?

- The program is configured as a professional science Masters degree with advanced coursework, professional skills development, community outreach and hands-on, team-based research.
- 20 mentors from the research university stem cell program have agreed to continue accepting interns in their laboratories. This group covers a long list topics that interns will have the opportunity to study.
- The Program Director has been leading this program, and has extensive experience in mentoring. In addition, the director of the research university stem cell project orchestrates the mentors and the Bridges students.
- Link with local research university provides excellent opportunities.
- The institution has considerable potential to attract students from underserved populations. It will be advertised to students throughout California, with an emphasis on minority serving institutions and programs.
- Good diversity and inclusion plan.
- Already established so should be achievable.

Has the track record and outcomes of a prior training program demonstrated success?

- Over the last 11 years the CIRM Bridges students interning in laboratories within the stem cell Masters program have contributed to the development of stem cell science on multiple diverse areas. Thus, there is a strong track record of accomplishment from previous students.
- Of the tracked students who have graduated from the Masters program as part of this particular CIRM program, most are currently working within the biomedical sector or are in PhD programs.
- The program track record is outstanding, and since its beginning this CIRM supported Masters program is putting people in a position to contribute to local research university research teams.
- Most of the graduates continue their education in laboratories, hospitals, industry or in the pursuit of higher education goals. Of the graduates from this program, the information on 69 of them is: 65 are working in the biotechnology industry, with 14 actively working towards doctoral degrees. Others are scientists and researchers in different parts of the scientific community.
- Excellent track record but should improve tracking mechanism.
- Yes--but there are some concerns about not being able to track a high enough percentage of students who have completed the program.
- Tracking only 75% of trainees is too low and a weakness.
- Tracking of trainees could be improved upon.
- Trainee demographics are missing.

Application #	EDUC2-12693
Title (as written by the applicant)	CIRM Bridges Science Master's Program
Abstract (as written by the applicant)	Situated in the epicenter of biotechnology and stem cell research, our university is ideally suited to house the proposed CIRM Bridges 2.0 program, which will contribute to the growth of an important sector of the local economy and the life science workforce. Our university is known for its academic excellence, equity, and efforts as a propeller for regional mobility and thriving economics. Our students, alumni, and faculty members contributed to the economic, civic, cultural and fiscal fabric of the area. Our CIRM Bridges-to-stem cell training programs have operated as passageways for many first-generation students and students from underrepresented groups sending them to academic research institutes, Ph.D. and medical schools, pharmaceutic, cell therapy and startup biotech sectors. By capitalizing on the extensive and productive collaboration with our academic and industry partners, and the robust student training practices already instituted at our university, we are applying to relaunch the Bridges 2.0 training program under Proposition 14 to continue to train talented, diverse and motivated students for successful career paths to become future leaders in the biomedical workforce. The comprehensive curricular revision will augment the research skill proficiency of the participating students preparing them to develop a life-long appreciation for the importance of diversity, equity and inclusion. Our Bridges Science Master's Program is designed to prepare competent and committed professionals for both academia and industry to accelerate the discovery, development and delivery of stem cell, gene therapy and related technologies for improving human health. The program provides course work in STEM, business, and research practices, and is tailored to students interested in pursuing leadership positions in the biotechnology sector or advanced academic training programs. The new Bridges trainees will have the opportunities of enrolling in courses that prepare them for career paths of their professional interest. Examples of such student-centered career paths include: biotechnology and management, data science, science education and communication, or cellular science and neuroscience. In the first year of the program, students will take core courses at home campus to build a strong foundation in stem cell science. A subsequent 12-month internship research training program at one of our host institutions or affiliated stem cell companies across the area, funded by the CIRM fellowships, will provide the trainees extensive skills in stem cells and/or gene therapy. By the end of their training, the Bridges trainees will complete a master project report written in the form of a journal manuscript and pass an oral defense to enter the workforce or advanced graduate programs with the competencies that are essential to master the challenges awaiting life science professionals in the 21st century.
Statement of Benefit to California (as written by the applicant)	Our university is a primarily undergraduate and Hispanic serving institution and a vibrant university of engagement, opportunity and scholarly activity offering its students outstanding opportunities for hands-on learning and discovery. It is one of the nation's most ethnically and culturally diverse campuses impacting student success and scientific discoveries through the collective efforts of faculty members, students, and collaborators, including our premier training partners. A Bridges award will offer outstanding training opportunities for a student population that is 43% BIPoC (Black, Indigenous & People of Color); 55% female; 32% First-Generation; 30% economically disadvantaged with 66% receiving financial aid; pre-Pandemic, 49% of the students reported food insecurities. By bringing together faculty members and researchers across the campus and community, the CIRM Bridges program will open new opportunities for collaboration, promote the implementation of innovative interdisciplinary curricula, increase research productivity of faculty members and students, and expand into other STEM areas in California. By integrating rigorous scientific coursework with business training and industry research practices, our training program housed in the Department of Biology provides trainees broad skillsets needed for success in applied bioscience careers. The proposed program is designed to increase diversity in the California workforce by increasing the participation of students from disadvantaged backgrounds and to prepare all participants for success in an increasingly diverse workplace. The trainees will be enrolled in the Master of Science degree program in Biomedical Science with Concentration in Stem Cell Science (Bridges Science Master's Program) to prepare competent and committed professionals for both academia and industry to accelerate the discovery, development and delivery of stem cell, gene therapy, and related technologies for improving human health. The program provides additional course work in business and is tailored toward students interested in pursuing careers in the

	biotechnology sector or advanced academic training programs. Students graduating from the program will emerge with life science competencies. The outcome and impact of the renewal program will be substantial, transformative and long-lasting. Long-term, it will contribute to the diversification of the research and scientific workforce, as it supports underrepresented groups and disadvantaged students in the biological sciences, providing a solid foundation for students to launch their careers, and to nurture the development of both formal and informal support networks crucial for academic success and career advancement. This program will augment partnerships between our university and other academic institutions and the private biotech sector to increase biomedical workforce talents and catalyze California economy.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 90

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	91
Median	90
Standard Deviation	2
Highest	95
Lowest	90
Count	14
(85-100): Exceptional merit and warrants funding, if funds are available	14
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	13	0
Is the proposal well planned and designed?	13	0
Is the program proposal practical and achievable?	13	0
Has the track record and outcomes of a prior training program demonstrated success?	13	0

Does the proposal have the necessary significance and potential for impact?

- The trainees will be admitted to the institution's MS-Biomedical Science program, a two-year interdisciplinary training program.
- The program provides academic and research training, structured mentorship, professional development opportunities, and summer enrichment opportunities.
- Focuses stem cell, regenerative medicine, drug discovery and development curricula.

- The combination of coursework and internship experience are designed to prepare students for stem cell-based lab work in academic or industry labs.
- Internships are heavily weighted towards academic labs. Although these labs provide an excellent experience, more company labs should be added.
- Notably strong, well developed diversity, equity, and inclusion plan with specific goals and assessments. As a result, the project is likely to have impact, perhaps even beyond the specific program. It could serve as a model for including consideration of DEI in STEM education. To this end, the program connects to other funded efforts to enhance the diversity of biomedical researchers by improving teaching and research environments.

Is the proposal well planned and designed?

- Diversity of current and past students is strong.
- Well organized and spelled out mentoring program.
- Notable connections to related efforts at the institution.
- Program director has no formal training in education or educational theory. However, they have published papers on science education, demonstrating interest and expertise in educational research and theory.
- While all core training activities are presented, key details are lacking about their effectiveness.
- Details on activities are lacking, including learning objectives.
- The plan to increase diversity has superficial text, but seems to encompass very specific and effective programs. I would like to have seen specific measurable and quantified metrics listed in this section, such as proportion of diverse students in program compared to institutional enrollment and compared to the surrounding community.
- The outreach section is a bit vague and nonspecific. It lists a set of clubs and details about the clubs, but the plan is merely to "synergize with" these clubs. What exactly are you going to do for outreach? One way to approach this would be to list a specific set of activities, and to assume that these activities actually increase diversity. You can measure the program's overall increase in diversity. But can you then measure which of these outreach activities (if any) was responsible for the increase? You need to implement measurable interventions. Consider crafting an intervention using "Bloom's taxonomy" verbs.
- Several opportunities to engage with patient groups, patients and health care providers. However, the structure of these events and learning objectives are not discussed. Unclear if students will learn how to properly engage with these groups in relation to stem cells and issues of diversity, equity and inclusion.
- There should be more involvement of industry (courses and internships).

Is the program proposal practical and achievable?

- Internships at diverse institutions such as research universities and stem cell startup companies.
- Addressed some challenges of pandemic (COVID) social distancing issues, which could recur; but would have liked to see a few more plans for remote training contingency needs.
- Lack of required training in biostatistics is a shortcoming.
- Input from industry on course content not addressed.
- Matching funds seem a bit weak - "Provide release time from one course each semester for Program Director to enable them to devote sufficient time to program leadership." "Continue to provide access to classroom, conference room, and furnished office space for the CIRM Bridges Program and its associated functions."
- PD does not have training in education.

Has the track record and outcomes of a prior training program demonstrated success?

- This is a continuing program since it's establishment in 2009. 111 students since 2009 have impressive outcomes, all but about 3 in relevant fields are on track to get there. 49% found employment at biotech companies or as research associates or lab managers in academic labs; 31% of the CIRM alumni attend or completed prestigious Ph.D. programs where they continue(d) their training in the stem cell or related fields.
- To date, the program has been very good at recruiting and training students.
- Letters from internship faculty indicate the high quality of training.
- Graduates are committed to biomedical and stem cell research.
- Great tracking of graduate outcomes.
- Graduate Outcomes Table: fairly good record-keeping (e.g., includes title of theses) but outcomes like "applying for positions in academia and biotech" is a bit vague. Would like to see more precise descriptions of cases like these.
- Good diversity track record but metrics can be improved.

Application #	EDUC2-12607
Title (as written by the applicant)	Bridges to Stem Cell Research and Therapy
Abstract (as written by the applicant)	This project will support further development of an existing stem cell biology training program featuring varied internship opportunities at established host institutions, a rigorous curriculum, substantive auxiliary training, and advanced stem cell techniques coursework. Based upon their demographics (79% minorities, 47% low-income, and 45% first-generation), extensive experience in biotechnology training, and an effective current internship program, the applicant institution anticipates that interns recruited for this project will strongly represent the diversity of California's population. Recruitment of interns will encompass strong community outreach (including dissemination of stem cell education module), inviting students from local colleges to seminars and activities, advertising to campus and community, and leveraging support from established biotechnology research and training centers. This CIRM Bridges project will provide up to 50 one-year internships over five years. Interns will be offered research opportunities with mentors in fields ranging from basic science of stem cells to translational research in regenerative medicine to gene therapy, and will be required to complete Certificates of Achievement in Biological Technology (or equivalent) and Stem Cell Culture. Stem cell-related coursework includes specialized techniques and instrumentation, stem cell-based biomanufacturing, fluorescent microscopy, and a journal club. A stem cell unit has been added to genetics, bioethics, and bioinformatics courses. Stem cell modules have been produced at college and secondary levels. Auxiliary training includes seminars (intellectual property and confidentiality, stem cells and regenerative medicine, bioethics, stem cell careers, advising and career development, diversity in STEM, disparity in healthcare), specialized workshops (data management, bioinformatics, flow cytometry, confocal microscopy, real-time imaging, cell and gene therapies manufacturing, scientific communication, and graduate school applications), scientific meetings and symposiums, and research presentations. Interns will also take part in patient and healthcare engagement activities and study the regulatory pathway in therapy development. In addition, the project will implement a Diversity, Equity and Inclusion Plan that incorporates targeted outreach to disadvantaged and first-generation students. By combining established programs and partnerships, rigorous curriculum, mentoring at both home and host institutions, performance evaluations of trainees and program, and experienced leadership and research opportunities at partner institutions, the program will produce highly qualified lab personnel for stem cell research in both academic and industry settings. The training will prepare CIRM Bridges interns to work at many levels in stem cell research and therapy labs (lab assistant, lab manager, professional staff, and research associates), or to continue in postgraduate programs.
Statement of Benefit to California (as written by the applicant)	This CIRM Bridges to Stem Cell Research and Therapy Award aligns with and will fulfill CIRM's objectives to: create stem cell training programs that significantly enhance the technical skills, knowledge, and research experience of a diverse cohort of trainees in the development of stem cell-based and gene therapies; foster a commitment among trainees to the goal of accelerating the delivery of stem cell-based and gene therapies to patients; and broaden the participation in stem cell science of individuals representing the diversity of California's population. The diversity of prospective interns is ensured by both the applicant institution's demographics (79% are minorities, 47% are low-income, and 45% are first-generation) and their broad experience with disadvantaged and underrepresented student populations in their biotechnology and internship programs. The grant supports and enhances an existing stem cell biology training program that includes: • internship opportunities with mentors in fields ranging from basic science of stem cells to translational research in regenerative medicine to gene therapy • up to 50 one-year internships over life of the grant • rigorous curriculum and established Biotechnology Certificate Program • established partnerships between the home institution and host institutions • substantive auxiliary training opportunities • advising and career development and job preparation program • cell and gene therapy good manufacturing practices (GMP) • patient and healthcare engagement activities

	• coursework on the regulatory pathway and therapy development process • advanced stem cell techniques coursework • bioinformatics, optical imaging, and FACs training workshops and seminars • extensive mentoring and program evaluation strategies • experienced leadership at partner institutions • a Diversity, Equity and Inclusion Plan to ensure that outreach to underrepresented groups is prioritized within the intern recruitment process. These attributes will ensure that the program produces highly qualified lab personnel from diverse backgrounds for stem cell research in both academic and industry settings.
Funds Requested	$3,605,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 90

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	90
Median	90
Standard Deviation	3
Highest	98
Lowest	85
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	13	1
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- This institution has been the home of one of these programs for the past 12 years. This institution has an existing stem cell biology training program that features internship opportunities at established institutions, a rigorous curriculum, substantial additional training, and advanced stem cell techniques coursework.
- Well-designed to prepare laboratory personnel with excellent background training.
- Students have been placed as internal hires in over 50 sites, including public and private institutions, academic and research facilities and private companies.

- DEI prioritized in recruitment. Community outreach to high school students and community colleges and from internal programs that target the disadvantaged, addressing pipeline issue.
- Program includes a robust trainee recruitment and selection process that provides extended support to help eligible candidates prepare an application and be successful in their internships.
- The overall design of the program is strong.
- Established and designed program to train technicians.
- Training in the context of a strong biotechnology program.

Is the proposal well planned and designed?

- Outstanding partner institutions for intern work.
- Strong engagement with great partner institutions with diverse basic and translational research opportunities.
- Extensive list of outstanding mentors.
- The design is both creative and solid. The mobile stem cell lab is of interest.
- Mentored internships in great institutions. Other components are weak and not well integrated with each other; not clear how trainees would benefit from some of the initiatives that are mentioned.
- Great coaching.
- Multiple specialized workshops are planned, covering a broad range of topics with great significance in the training. These include data management and statistical analyses, bioinformatics, flow cytometry, confocal microscopy, real-time imaging, and cell and gene therapies manufacturing.
- Activities to enhance the educational progress include seminars, workshops and other related training to ensure understanding of stem cell research and regenerative medicine, cell and gene therapy good manufacturing practices and preparing students for the workforce and education.
- Bridging stem cells to the clinic course at a nearby institution: This regulatory pathway course is required, and provides training in IP, FDA approval process, project management, and bioinformatics.
- The program will develop and add a cell-based biomanufacturing course, which aligns with current national priorities.

Is the program proposal practical and achievable?

- This project provides up to 50 one-year internships over five years, covering multiple areas of education related to needs in the workforce for regenerative medicine. There is extensive training in specialized techniques as well as the basic concepts, seminars on a wide range of topics.
- Many of the programs are in collaboration with nearby research universities, thus providing outstanding support for the training of the participants.
- Clear protocol for trainee assessment.
- Committees include institution academic staff and host institutions, as well as a mentoring committee.
- Outstanding community outreach.
- The involvement of trainees in outreach and patient engagement is not well described, in contrast to the well-described internship component of the program.
- Hands on, engaged Program Director.
- Program Director developed a portable stem cell lab for high school students.
- Yes, however there is some concern about the quality of tracking of outcomes.

Has the track record and outcomes of a prior training program demonstrated success?

- The program has a strong track record of trainee success and inclusion, but this is expected since most interns have already successfully completed an academic degree, demonstrating their capability to succeed in academic contexts.
- Thus far, 78 students have participated in this internship program. Of these, 76% were minorities. Publications were reported for 23 interns, with 27 publications.
- The recruitment of diverse students is strong.
- Diversity and inclusion in recruitment.
- Significant diversity.
- Good track record.
- Outcomes of high school outreach activities are not clear.

Application #	EDUC2-12611
Title (as written by the applicant)	CIRM Bridges to Stem Cell Research and Therapy Training Grant
Abstract (as written by the applicant)	California is a leader in advancing stem cell and regenerative medical research and programs that create a pipeline for the training and development of the next generation of stem cell scientists in the field, which are critically needed. Our program provides an opportunity to diverse college students to receive high quality technical training, mentorship, and professional development. Program components include placing trainees at host site labs in academia or industry in a stem cell research lab that culminates with presentation of their project at scientific conferences. The number of host site lab placements offer a wide range of stem cell related research topics under well-recognized researchers in the region. We supplement the internship experience with K-12 outreach, patient engagement and advocacy, mentee training, education, and professional development programming. Trainees earn college credit towards application of a four-year degree by engaging in the supplementary activities. Our goal is to provide a broad and comprehensive view of the field and develop “stem cell ambassadors”, who are ready to engage people in their personal and professional networks in effective communication on the impact of stem cell research. Our program is unique and closes an opportunity gap for students in our region. We recruit from our four-year university and four community colleges that offer life science and biotechnology coursework, certificate, and degree programs. Similar to our regional population demographics, students attending these institutions are racially and socioeconomically diverse and have differential educational backgrounds and life experiences. We train 10 students per year, who are representative of our region and often remain in the area to join the scientific workforce. Therefore, California will benefit from this additional pool of well-prepared stem cell scientists from diverse backgrounds that have a broad understanding of the benefits of stem cell research and can continue to advocate and accelerate California’s commitment to advancing stem cell research, treatments and therapies for human diseases.
Statement of Benefit to California (as written by the applicant)	California is a leader in advancing stem cell and regenerative medicine and the field is progressing rapidly towards viable therapies and cures for human disease. In order to continue to accelerate this progress and drive future innovation, we must provide a pipeline for the training and development of a diverse pool of stem cell scientists. Our program is designed to meet this need by providing an opportunity for diverse college students to receive comprehensive training and education allowing them to enter this field more quickly than traditional pathways. Additionally, we develop well rounded stem cell researchers who understand the full “bench to bedside” process of bringing treatments to the clinic. Simultaneously, they learn the need for public communication and outreach so that the regional community understands the benefits from their research. Our institution has partnered with four regional community colleges to ensure recruitment from these diverse student populations. We deliver a robust and comprehensive internship program from primarily the undergraduate and graduate levels for an intensive year-long research experience at academic or biotechnology industry laboratories. Trainees focus on a variety of applications of stem cell research to treat complex neurological diseases such as Alzheimer’s, Parkinson’s and autism, and other disease targets such as cancer and diabetes. Our student trainees receive college credit and will be supported by educational enhancement and patient advocacy activities through community organizations. At the end of their internship year, our trainees will be prepared to contribute to California’s workforce pipeline and/or continue their academic journeys. Our program impact is significant. We will train 10 trainees each year, who are representative of our diverse region and often remain in the area to join the scientific workforce. Therefore, California will benefit from this additional pool of well-prepared stem cell scientists from diverse backgrounds that have a broad understanding of the benefits of stem cell research and can continue to advocate and accelerate California’s commitment to advancing stem cell research, treatments and therapies for human diseases.
Funds Requested	$3,606,500

GWG Recommendation	*(85-100): Exceptional merit and warrants funding, if funds are available*
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 90

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	90
Median	90
Standard Deviation	2
Highest	95
Lowest	85
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- The program has been funded for 12 years and has trained many participants that are now employed in biotechnology and other stem-cell related fields. This achievement is particularly impressive since the majority of trainees enter this program without a BS/BA degree.
- The program provides very strong training for B.S. and community college students. The various technical and professional development activities are well-considered.
- This should produce a good cohort of 10 trainees per year, with an excellent percentage of internships completed.
- Providing exposure to industry and regulatory issues is a strength. These are important skills in the workforce that are not part of many training programs.
- Program has excellent track record of training interns, nearly 60% of whom are from community colleges thus broadening participation in stem cell research.
- Collaborations with community colleges for recruitment.
- Emphasis on community colleges.
- Solid training program with good completion data.
- Using national tools for assessment.
- Not static; the program has continued evolving.
- Good leadership.

Is the proposal well planned and designed?

- The program has notable strengths in using evidence-based approaches, such as strong cohort development and validated assessments for the internship portion of the program.
- Partnerships with community colleges and with another nearby Bridges program add unusually strong depth to the program's potential impact and the connections of their trainees to those in another Bridges program.
- Expansion of partnering of the applicant institution with local community colleges is innovative.
- Involvement with community colleges is a plus.
- A broad range of academic and industry hosts are available to the participants.
- Good set of partnering institutions and a good program plan and curriculum.
- The various technical and professional development activities are well-considered and evidence-based.
- Since the majority of recruits to the program are still pursuing a BS/BA degree, the program has implemented an Entering Research evidence-based course that was developed by CIMER at U. of Wisconsin that will be supplemented by the project coordinator on activities focused on issues of bias, cultural awareness, impostor syndrome and stereotype threat that are particularly important for under-represented participants.
- DEI training is strong.
- There are some logistical questions of how students can take courses that will count for their degree programs across institutions.
- Not clear if students have training for the outreach and volunteering opportunities.
- Weak community outreach plan.
- Questionable evaluation plans.

Is the program proposal practical and achievable?

- The program has a solid training record and a long-standing relationship with both Tier 1 academic institutions and biotechnology firms to host trainees in their laboratories.
- The program has a strong track record of supporting the success of its interns, who may have more hurdles than other programs that serve students who already have degrees or have completed extensive preliminary coursework.
- Activities focus on meaningful preparation and internships that can be completed in the context of the degree program.
- Evidence based.
- Clear proposal.
- No concerns.

Has the track record and outcomes of a prior training program demonstrated success?

- The program demonstrated success in placing 51.2% of the trainees as professionals in the biotechnology industry. In addition, 25.6% of former trainees are in the process of attaining undergraduate, graduate, or post-doctoral degrees, thus adding to the future pool of researchers in the biotechnology and stem-related fields.
- The increase in interns from Hispanic backgrounds is notable.
- The program has a strong record of completion and a significant number of program participants are in the biotechnology workforce.
- Improvements in training students from a diverse background are evident.
- Yes--excellent track record.
- Very positive change in the involvement of under-represented students.
- Track record is good although BS completion could be better.
- The program would benefit from more detailed tracking of alumni.
- Program evaluation is missing; not known why <100% graduation rate.
- Not clear how many trainees are employed in stem cell research jobs.
- Inadequate outcomes reporting.
- Tracking system is weak.

Application #	EDUC2-12720
Title (as written by the applicant)	Stem Cell Scholars: a workforce development pipeline, educating, training and engaging students from basic research to clinical translation.
Abstract (as written by the applicant)	The Stem Cell Scholars training program has the following three robust components to ensure its success and provide great benefit both to the students/interns and the communities that our campus serve. 1 Courses to prepare the students for research internship. Students will be trained in all aspects of stem cell biology and therapy applications. Courses on stem cell biology and hESC technologies will ensure that that the students have the skill set to be successful and receive maximum benefit from their subsequent internship. They will also benefit from coursework that will familiarize them with the regulatory affairs process and give them an understanding of how basic research translates into a clinical trial and ultimately to a well-accepted therapeutic protocol. A tissue engineering course and a bioprocessing summer boot camp will further strengthen their knowledge base and make them even more competitive in the workplace. 2. Volunteer opportunities to ensure students engage with the community. Students will engage with patient groups and organize educational seminars to interested members of the community. Students will volunteer at local hospitals or on campus to organize healthcare related events. The Student Society for Stem Cell Research will provide our students with an avenue to organize and share experiences with each other and the local community. The society offers several events that have both educational and engagement aspects for our own student population and the local middle and high schools. Students will perform community outreach by giving lectures at local schools and participate in Stem Cell Symposia and seminars organized by the local Stem Cell Consortium. 3. Provide mentoring and career advice. Both the PI and host labs will take a meaningful role in the mentorship of our student interns. Included are year-long career mentoring, writing, and data science management workshops along with networking activities that will enable our interns to procure meaningful and satisfying careers in the stem cell research and therapy sectors. Over the 5-year period of the grant, we will train 35 undergraduate and 15 graduate students at host sites with whom we have established strong and highly collaborative relationships. Our highly diverse and talented student population means that our program promises to not only provide appropriately qualified graduates in the relevant disciplines but to provide diversity in these graduates as well. Our goal is to prepare these students to enter the workforce that has been created as a result of CIRM funding. Work possibilities include research technician positions, regulatory affairs professionals, or going on to advanced educational programs such as medical or graduate schools and ultimately serving in translational medicine clinics.
Statement of Benefit to California (as written by the applicant)	This renewal proposal aims to recruit, identify, educate, and train a diverse group of 50 undergraduate and graduate students in stem cell research and therapy while providing them with avenues for community outreach and volunteerism. The passage of Proposition 14 in 2020 has allowed continuation of the very successful Bridges program with some important added components. In 2021, CIRM's programmatic needs have shifted to training a diverse group of undergraduate level and masters level students not only in technical skills but also engaging these students to become stakeholders by carrying out significant community and patient outreach efforts and understanding the regulatory hurdles and issues that challenge the transition from discovery to therapy. Because of our strong and diverse base of underrepresented students in STEM, our Bridges Scholars Internship program promises not only to provide appropriate trained and qualified graduates but to give them opportunities to contribute to their local community both by educating K-12 students and volunteering in a variety of settings in the healthcare sector. Our program will have the following components:

	1. An effective pipeline of courses that will enrich the education of the pool of students, along with recruitment, mentoring, and career advising. 2. Educating and training the interns in basic tissue culture and advanced human embryonic cell culture techniques, stem cell biology theory, tissue engineering and bioprocessing courses, basic concepts in regulatory affairs, and how human embryonic cells can end up providing a therapy for a diverse group of patients with as yet unmet medical needs. Emphasis will also be put on educational platforms that highlight the present profound disparities in healthcare delivery, especially when it comes to specialized therapies. 3. Patient and healthcare engagement by volunteering in support groups, providing community education and other avenues which are presently constrained because of COVID. 4. The Student Society for Stem Cell Research will spearhead educational outreach components that will include local campus seminars, regional Stem Cell Symposia, delivering lectures at local middle and high schools and attending regional conferences that are patient centric. 5. Over the five-year period of the grant, we will train 35 undergraduate and 15 masters level students. Our distinct goal is to prepare these students to be able to enter the workforce and contribute their expertise and training in a variety of healthcare delivery settings, from carrying out research in a lab, having careers in regulatory affairs or clinical studies, to being a stem cell therapy physician. We see ourselves as part of the mission of improving the health and quality of life for the millions of people for whom no therapies are currently available for their chronic diseases or injuries.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 90

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	90
Median	90
Standard Deviation	1
Highest	92
Lowest	90
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel’s discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0

Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- Builds on highly successful program: 90% success rate in enabling students to get hired as research techs or gain admission to PhD programs or healthcare professional programs
- Program is extension of current Bridges grant (11 years running) – more than 100 students, with diversity of interns mirroring the university student body.
- This is a highly successful program. Past performance indicated future performance. Past graduates are impacting science in California already, and there is every reason to expect that future graduates will do the same.
- Strong overall program, with track record of successful internships and placement into relevant careers/career paths.
- Well planned and previously successful.
- Strong history of providing training.
- Long term productivity of program.
- Established successful program.
- Innovative plan to increase diversity.
- Academic career program to help gain skills required for further career advancement.
- Community engagement-education K-12-Student Society for Stem Cell Research. Engagement with Americans for Cures (new agreement) provides connections to patient advocacy groups. Volunteer activity in healthcare sector.
- Excellent training program focused on practical skills.
- Virtual plan included to address issues with pandemic.

Is the proposal well planned and designed?

- Strong plan, with solid design and good diversity plan.
- Internship placement involves matching students with labs interested in hosting – 100% success at placing interns.
- A number of courses are required, that are typically also attended by biology majors and will also take four enhancement workshops including writing in the sciences, data science management, bioprocessing bootcamp, and a Stem Cell Symposium.
- Well designed curriculum.
- Tissue culture, stem cell biology, coursework, regulatory affairs covered (mandatory). Tissue engineering opportunities excellent. Includes a bioethics course.
- Technical training Stem cell Tissue culture course a research university run by someone with 20 years experience.
- Focus also on bioengineering.
- Great volunteering and outreach opportunities.
- Workshop on health disparities. Volunteer work at hospitals.
- The material covered in the workshops is appropriate. I would have liked to see details on how many in-class hours each workshop entailed.
- Plan to increase diversity with outreach program is detailed, specific, and successful; e.g. "To build a pool of students for future, we take part in the Black and Brown Young Men's conference and connect with 8th grade students."
- Clear plan to increase diversity.
- A notable strength is the involvement of a national stem cell research student organization in outreach.
- Thoughtful discussion of impact of COVID on access to healthcare and support groups, and volunteerism among interns.
- Upward Bound stem cell program to introduce high school students to research-deals with the pipeline problem.
- Only the names, emails, and institution of potential research mentors is included in the proposal. It would be strengthened by the research mentors area of work and position.
- Matching funds are unclear. Not mentioned in institutional letter of support.

Is the program proposal practical and achievable?

- Strong group of partner institutions including many involved in translational research.
- Addresses challenges of pandemic (COVID) social distancing issues, which could recur.
- Experienced leadership team with strong advisory committee, administrative support. Advisory committee members have expertise in science education.
- Program director has not formal training in education or educational theory; none of the selected publications relate to training. However they state that they have, "engaged and mentored more than 200 undergraduate and graduate students in several research projects." They may wish to get more feedback on their teaching and mentoring ability from professionals in the educational field and/or student feedback.

Has the track record and outcomes of a prior training program demonstrated success?
• Track record of placing students in good training posts-90% in jobs or PhD program with a student population that has not previously had great success integrating into the biomedical research community/ diverse outcomes include laboratory tech, grad school, biotech. • There is an excellent record based on tracking details with strong percentage of students placed in STEM positions. • 90% success rate in enabling students to get hire as research techs or admission to PhD programs or healthcare professional programs. • Track record is well documented and excellent. • Very successful program. • Impressive outcomes. • Graduate Outcomes Table +102 students since 2011, with >90% with appropriate outcomes. However, I would like to see more detail. i.e., not just "PhD program" but also what field and what institution. More information in the "other outcomes" field would be useful and demonstrate a more robust graduate tracking ability. • No information on gender diversity amongst trainees or applicants. • PD lacks training in education.

Application #	EDUC2-12677
Title (as written by the applicant)	Stem Cell Internships in Laboratory-based Learning (SCILL) continue to expand the scientific workforce for stem cells research and therapies.
Abstract (as written by the applicant)	The Stem Cell Internships in Laboratory-based Learning (SCILL) is a consortium of scientists, faculty, and administrative leaders from institutions who have made a commitment to training students at the graduate level for careers in stem cell biology. Graduates from this program will advance and accelerate stem cell therapies and increase community awareness about scientific and societal issues related to stem cells and regenerative medicine. The university has partnered with three research universities and six companies to provide students with the academic and practical laboratory experience that will prepare them for careers in stem cell research and development of novel therapies. More than 60 stem cell researchers in this SCILL consortium are committed to educating and training students for careers in stem cell biology. The SCILL program is designed to be completed in two years. SCILL students will take graduate laboratory courses in immunology, molecular biology, flow cytometry, and stem cell biology, as well as courses in regulatory affairs, therapy development processes, and clinical trial management. Students will also engage in patient interaction activities in various medical settings and develop a community outreach plan to share their knowledge and their expertise in stem cell biology and regenerative medicine with their communities. Each SCILL trainee will complete 12 months of full-time hands-on research in human stem cells, progenitor cells, or gene therapy, at one of our research universities or translational research partners, involving stem cell product development. On the successful completion of the SCILL curriculum and internship, students are awarded a master's degree and are prepared for a career in stem cell biology. The SCILL Program has a solid track record in training stem cell professionals at a graduate level, all from among California residents and representative of the diverse ethnicities of our state. More than 95% of our students have completed the two-year program More than 90% are employed primarily in the state of California and about 50% of those are working in stem cell-related fields in academia, in the biotech industry, or have continued to higher advanced degrees. The current proposal has continuous strong institutional support as demonstrated by the matching funds to support the biology curriculum in stem cells education and provide faculty to support that as well as the CIRM Bridges program, and open the stem cells specialized classes to additional biology graduate students. Through funds provided by CIRM in this grant, we will continue to produce outstanding scientists who will accelerate stem cell therapies to patients with unmet needs in the state of California.
Statement of Benefit to California (as written by the applicant)	The State of California is in urgent need of therapies for a variety of degenerative diseases. Developments in stem cell biology progressively provide such therapies. The process of translating research-based innovations into useful, proven patient therapies is complex, and requires professionals at various levels. In creating the California Institute for Regenerative Medicine (CIRM) the voters in California ascended to a leadership position in developing stem cells for therapeutic applications. Through CIRM funding, the Stem Cell Internships in Laboratory-based Learning Program at our institution continues to generate well-rounded professionals who will accelerate the development of stem cell therapies. We train students who will provide the engine supporting California's stem cell research and industry. Students in the program complete a year of stem cell biology classes and laboratory-based courses followed by a year of full-time internship in leading labs in academia and biotech. We partner with premier institutions in the area to train SCILL interns at one of the research university partners and translational research at one of the corporate partners. We also train our students to understand and communicate with the people in need of stem cell therapies by engaging them in inpatient care at degenerative disease clinics and institutes for translational medicine. Our students will also reach out to their communities to educate wide audiences about stem cell discipline and stem cells pathway to therapeutic

	applications. Furthermore, the SCILL Program provides young people from California from diverse backgrounds with a university master's degree in science and career opportunities in this expanding California industry. The SCILL Program is now in its 11th year. One hundred and twenty Californian students will be graduating by the end of this funding cycle. The ethnicities of our students reflect on the demographics of the county's diverse population. Through the SCILL program, 90% of these graduates now hold professional positions primarily in California, and more than 50% work in biotech companies that accelerate stem cell therapies. About 30% of the graduates work in academic labs advancing stem cell research. About 15% of SCILL graduates continued to Ph.D. programs or medical school and will further advance this field in the future. The current proposal has strong institutional support as demonstrated by the matching funds. With CIRM support, SCILL will continue to provide high-level Californian professionals that will contribute to a more holistic approach to stem cell therapies. This program will build on our strength in scientific training to include a commitment to therapy development and community involvement.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 90

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	90
Median	90
Standard Deviation	3
Highest	95
Lowest	85
Count	14
(85-100): Exceptional merit and warrants funding, if funds are available	14
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	13	0
Is the proposal well planned and designed?	13	0
Is the program proposal practical and achievable?	13	0
Has the track record and outcomes of a prior training program demonstrated success?	13	0

Does the proposal have the necessary significance and potential for impact?

- The program is well-designed to produce well-trained individuals. The program has been adaptive in the sense of adding new components to the program that better serve the education of the current students.
- Based on the prior history of the program and careers of the students in the program, the graduates of this program will contribute to the development of stem cell-based therapies and gene therapy. The student outcomes for the program are excellent with a good balance between engaging directly in relevant biotech careers or continuing with additional education in relevant STEM fields.
- Program offers a comprehensive two-year master's program with a focus on stem cell research.
- The program has an established track record of placement in academic and company labs. Director has been with program since 2009.
- This is a highly successful program. Past performance predicts future success.
- The program provides appropriate training and aligns with the goals of the BRIDGES program.
- Well established processes are in place.
- A strong program. Could focus more on other types of stem cells beyond embryonic stem cells.
- The program has poorly developed strategies for recruiting diverse students into the degree program, limiting its potential impact.

Is the proposal well planned and designed?

- This is a well-established program that has evolved to provide an outstanding training environment for the students as evidenced by their subsequent placements in positions that will further the goals of CIRM.
- Through CIRM funding, the Stem Cell Internships in Laboratory-based Learning Program (SCILL) continues to generate well-rounded professionals who will accelerate the development of stem cell therapies. They train California State University students who will support California's stem cell research and industry.
- Stem cell lab in first year is a plus.
- Application provides innovations to improve the program.
- Significant internship opportunities, although heavily focused on academic labs.
- Many opportunities to engage and learn from interactions with patient support groups.
- Very strong preparation to work with patients/patient advocates.
- Nice to see mention of how training activities could be modified in case of need for social distancing (e.g., pandemic/COVID). This section could be a bit more detailed. Perhaps as part of contingencies plan for unexpected circumstances.
- Many of the activities seem to be going to where the interest already is (e.g., biology course classrooms).
- Institution is diverse.
- Program director does not have formal training in education or educational theory; they have lots of hands-on mentoring experience; but none of the selected publications relate to training. They may wish to get more feedback on their teaching and mentoring ability from professionals in the educational field and/or student feedback.
- Program recognizes need to increase Hispanic representation. Perhaps reach out beyond the program itself. What about actively targeting specific promising students and courting them like an NCAA basketball coach would go after a promising young basketball player?
- Other "action" words in the diversity plan include verbs like "emphasize" and "encourage" and "try". These are bland and non-specific. What exactly are you going to do? One way to approach this would be to assume that these activities actually increase diversity. You can measure this increase in diversity. But can you then measure which of these activities (if any) was responsible for the increase? You need to implement measurable interventions. Consider crafting an intervention using "Bloom's taxonomy" (easy to find in web search) verbs.
- Some concerns about use of temporary instructors. There are some concerns about recruitment of students.

Is the program proposal practical and achievable?

- The goal of the SCILL program is to generate professionals who are ready to enter the stem cells workforce in academia and industry. The SCILL program will be a two-year masters' program that will initially equip students with a broad education of stem cell biology through classroom lectures, seminars presented by stem cell expert graduate laboratory-based studies at the institution.
- SCILL partners with institutions in the nearby area to train interns at one of the research university partners and translational research at corporate partners.
- Advising and Career Development Activities provide limited discussion of career paths. Perhaps this is covered in the career advancement session at the education and research meeting, but should be discussed in more detail.
- Matching funds - a little unclear how much of these funds would be spent anyway, even if the grant was not awarded (i.e., what is the opportunity cost to the institution of using these funds to match this grant).

Has the track record and outcomes of a prior training program demonstrated success?

- The SCILL Program is now in its 11th year. One hundred and twenty Californian students will be graduating by the end of this funding cycle. Through the SCILL program, 90% of these graduates now hold professional positions primarily in California, and more than 50% work in biotech companies that accelerate stem cell therapies. About 30% of the graduates work in stem cell academic labs.
- Many of the graduates of the program have positions related to biomedical research and have published papers involving stem cells.
- Impressive Graduate Outcomes Table: 100 Graduates listed, >95% relevant outcomes.
- Well established program.
- A great track record and outcomes.
- Excellent track record of placement in stem cell related areas.
- Good student publications.
- Recruitment plan should be improved.

Application #	EDUC2-12726
Title (as written by the applicant)	Training Masters Students to Advance the Regenerative Medicine Field
Abstract (as written by the applicant)	Our proposed training program is an interdisciplinary Specialization in Regenerative Medicine, offered within the masters of science (MS) degrees of 3 different departments from 3 academic units, and based upon over 10 years of experience directly training students in this area. The goal of our MS program is to graduate 10-11 day-one ready professionals per year who are capable of advancing CIRM's mission of accelerating regenerative treatments and cures to patients with unmet clinical needs. The first step in achieving this goal is a year of coursework and project experience at our institution, which will prepare students by training them in a variety of skills. Specifically, students will learn to: 1) Perform fundamental laboratory techniques involved in regenerative medicine research & development, including cell culture, cell transplantation, microscopy, and molecular biology. 2) Discuss and critically evaluate biomedical primary literature. 3) Effectively communicate technical topics to peer and general audiences. This will include community outreach with K-12 schools, community colleges, and other community groups. 4) Explain the process of biotechnology development and commercialization. Developing this skill will include exposure to FDA regulatory pathways and other areas of product development ranging from early research to manufacturing and more. 5) Describe how research and development efforts are motivated by and impact patient experiences. This will include direct patient engagement. 6) Design and execute independent research projects, by carrying out a culminating capstone project on campus. Achieving these six learning objectives, along with a practical training course in critical methods of cell manufacturing, will allow students to effectively advance product development and translational research during the second step of our program, which is a 10-month internship at one of our commercial or academic partner institutions. Students will work full-time during these internships, as they refine and further master relevant skills while contributing to a variety of current real-world applications. (The results of our students' previous internship projects have been included in journal publications, conference presentations, patent applications, and regulatory approval documents filed with the FDA.) At the conclusion of our program, students will be poised to enter and directly impact the regenerative medicine field. Therefore, this award will allow us to contribute to CIRM's mission of accelerating treatments to patients with unmet clinical needs by providing the crucial workforce with specialized skills.
Statement of Benefit to California (as written by the applicant)	Our proposed program will benefit California in several ways, beginning with the first beneficiaries- the students in the program. Through our broad recruitment strategies, we will attract a diverse cohort of students to benefit from the comprehensive training and 100% employment placement historically achieved by our program. The activities of our student cohorts will in turn benefit countless Californians by accelerating stem cell treatments to patients with unmet medical needs. This contribution depends upon this grant allowing us to deliver a pre-internship curriculum that would not be possible without CIRM support, and that provides highly effective preparation for the internship. As a result of this preparation, students at their internships can help advance both translational research and product development, and accelerate the identification of new therapeutic targets or strategies. Without CIRM support, most internship opportunities would not be possible, as the start-up companies developing regenerative treatments and cures are often without the revenue stream required for an internship program. In this way, our program accelerates the development of stem cell treatments by providing regenerative medicine companies with the technically-skilled emerging professionals needed to development new therapies. The regenerative therapies and cures that our students and future alumni help develop will directly benefit Californians who receive these innovative medicines, while also indirectly benefiting the entirety of our state by growing and strengthening California's economy. Graduates of our program have historically impacted, and will continue to impact, a number of fields, such as performing fundamental and translational research in academic laboratories and for-profit companies, developing and manufacturing regenerative medicine products at for-profit companies, and participating in clinical-trial organization at large medical centers. Our graduates will help position California as the world leader in regenerative medicine by providing the workforce necessary for this field, and the economic benefits of this outcome are great.

	Beyond the students that matriculate into our program and the benefits they impart, our outreach activities will also help build a diverse 'pipeline' by motivating students in K-12 schools and community colleges to pursue bachelors and advanced degrees in the fields that support regenerative medicine. These outreach activities will develop awareness, support, and enthusiasm among the general public for regenerative medicine. In summary, our program will benefit students and patients, help strengthen California's economy, and help build the regenerative medicine talent pipeline with the promise of a rewarding career and the chance to enhance medical practice and treatment options.
Funds Requested	$3,276,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 89

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	88
Median	89
Standard Deviation	3
Highest	90
Lowest	80
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	14
(1-84): Not recommended for funding	1

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	13	1
Is the proposal well planned and designed?	14	1
Is the program proposal practical and achievable?	14	1
Has the track record and outcomes of a prior training program demonstrated success?	12	2

Does the proposal have the necessary significance and potential for impact?

- This program has been in place for slightly more than eleven years. In that period they have demonstrated the ability to graduate laboratory professionals who mostly have gone into biomedical research both commercial or academic with many pursuing advanced degrees. Many of the graduates have continued to work in stem cell relevant areas.
- The program has demonstrated success in transitioning trainees into the stem-cell field.
- The industry focus is truly outstanding. Industry engagement throughout the coursework, internship, and community is clear.
- The program includes some rather recent advances in stem cell research in the curriculum. Interaction with biotechs is good.

- Overall the institution is a majority white institution, but has a sizeable representation of Hispanic/Latinx and Asian. The representation of Black or African American, Native Hawaiian or Other Pacific Islander, and American Indian or Alaska Native together is low with 12.2% reporting unknown ethnicity. This is different than California's demographics.
- The DEI plan is weak. A climate survey is important to do, but clear metrics, benchmarks, and plans for improving program diversity is missing.

Is the proposal well planned and designed?

- Pre-internship preparation is very strong.
- Distributed leadership among multiple faculty is a strength.
- The program has an interesting mix of contributors: the Departments of Biology, Biomedical Engineering, and Animal Science are members of the program. This provides a strong combination of expertise that is appropriate for stem cell research.
- Inclusion of student learning outcomes and objectives of proposal components is a notable strength.
- Strong plan for training on lay audience communication.
- They have added an Advanced Cell Culture Techniques Course (ACCTC) to integrate the experience in our Educational Enhancement Activities to teach students advanced cell culture techniques and cell therapy manufacturing processes such as scale-up cell culture, cell processing, and quality assurance assays.
- To promote growth of regenerative medicine, students will engage in community outreach with two goals: 1) motivating the next generation of scientists and engineers to pursue regenerative medicine, and 2) educating the general public on the rationale, initial successes, and long-term goals of regenerative medicine.
- Bioprocessing and bioreactor emphasis is good.
- Development of new advanced industrial stem cell course is not adequate; positive is the institutional support though.
- A key learning opportunity is the seminar on Regenerative Medicine Product development which will provide students vision/expectations of the "real world."
- Patient engagement and outreach activities might benefit from more structure.
- Patient engagement could be better.
- Not central focus on patient: plan not well organized.
- The patient outreach and engagement and mentoring programs are not as well developed as one would wish. There are some concerns about outreach to diverse students in this plan. Overall the program design is solid despite these weaknesses however.
- Very weak DEI statement.
- DEI statement superficial.

Is the program proposal practical and achievable?

- Program mentoring is very strong.
- Very strong support is provided especially from industry partners.
- The list of internship sites and mentors is very impressive. This is especially true given the geography of the institution. The program has anticipated the problem of students having to relocate for their internships by including a line item component for such expenses in the budget.
- Internal and external recruiting plans are in place.
- Assessment has been very detailed and driven improvements in the program.

Has the track record and outcomes of a prior training program demonstrated success?

- The program will advertise and offer overview presentations to groups that serve underrepresented students, and chapters of the National Society for Black Engineers, Society for Black Engineers, the Society of Hispanic Professional Engineers, and the American Indian Science and Engineering Society.
- The program has insufficiently considered and more importantly implemented recruitment/retention of a diverse training population.
- The program needs to do a better job of recruiting a diverse student population.

Application #	EDUC2-12638
Title (as written by the applicant)	CIRM Regenerative Medicine and Stem Cell Research Biotechnology Training Program
Abstract (as written by the applicant)	The proposed program will train exceptional and diverse students for career opportunities in the California regenerative medicine workforce, to accelerate the development of stem cell-based therapies to treat or cure patients with unmet medical needs. They will be recruited from the ~2,000 students in the Departments of Chemistry and Biological Sciences at a large comprehensive urban university, and qualified students from other institutions. This predominantly undergraduate institution, at which more than 95% of the students are Californians with more than 70% from underserved/underrepresented populations, has been designated a Hispanic Serving, and an Asian American, Native American, Pacific Islander Serving Institution. These students reflect the ethnic mosaic of the local communities, enrich the scientific enterprise with their unique perspectives, and educate their communities by sharing the knowledge and experience they gain in this training program. Students in the program will enroll in the two-year stem cell track of the post-baccalaureate Biotechnology Certificate Program. The stem cell track was established in 2009 and continues to be enhanced. The first year consists of courses and research experience at this university. Required coursework includes biotechnology, bioinformatics, stem cell biology, drug development and the regulatory pathway, and bioethics. In the second year, ten interns will perform full-time research in one of over thirty stem cell laboratories. Extensive mentoring, advising, and workshops throughout and after the program ensure successful academic and career placement for current participants and alumni. This program has a history of successfully training students for graduate study and for the California workforce. The stem cell interns will also engage in activities designed to engender in them an understanding and appreciation of the perspectives and experiences of patients with unmet medical needs and the urgency of accelerating the development of stem cell therapies. Some of these activities include interacting with patients at a local children's hospital and with diabetic patients and their families at other sites. Interns will also participate in community outreach and education activities: they will educate a diverse academic population by presenting at a University symposium; they will present for current and future high school and middle school teachers; and they will have direct contact with community leaders and the general public by participating in panel presentations for a leadership program and local community colleges (for both pre-health professionals and adult education classes). These activities could initiate a life-long appreciation of regenerative medicine stem cell technologies. This may have a significant impact on our society given the role of the voting population in funding and promoting advanced technologies.
Statement of Benefit to California (as written by the applicant)	The goals of the proposed program are to train students, representing the diversity of California, to enter the stem cell research workforce and to accelerate the development of stem-cell based therapies to treat or cure patients. Both the State of California and its citizens will greatly benefit from this program. At this large, urban, State University, more than 95% of the students are California residents, and reflect the ethnic mosaic of the local communities. Students participating in this program will enrich the scientific enterprise with their unique perspectives, and can also educate their communities by sharing the knowledge and experience they gain in this training program. The California workforce will benefit from these diverse students being prepared to pursue careers in stem cell research, therapy, and regenerative medicine. During the two-year stem cell track of the post-baccalaureate Biotechnology Certificate Program, students receive specialized training and complete coursework including biotechnology, bioinformatics, stem cell biology, drug development and the regulatory pathway, and bioethics. Ten interns per year will then perform ten-month full-time research internships in stem cell laboratories. They will also participate in patient engagement activities to increase their awareness of the challenges patients face in daily life. The interns will engage in community outreach activities, with leadership groups and community colleges, to inform the public about the advances of stem cell research and regenerative medicine. These activities may have a significant impact on the State of California given the role of the voting population in the funding and promotion of advanced technologies.

	Students receive extensive mentoring throughout the program, including workshops in writing and submitting applications, in interviewing skills, and in scientific career advancement. These skills are critical for our students, many of whom are first in their families to attend University, first-generation US citizens, and/or members of groups underrepresented in science and medicine. Alumni of the program will continue to receive support as they advance their careers in stem cell research and regenerative medicine in the State of California. The State of California benefits by having a diverse and highly skilled workforce. This will facilitate the establishment of stem cell companies that translate this technology into the regenerative medicine market and contribute to the tax base. This will also lead to the development of novel therapies for patients with unmet medical needs. Ultimately, recruiting and retaining new scientists in the California workforce will help foster the growth of the high-tech biomedical sector of the California economy. This University has a long history of successfully training large numbers of diverse students for graduate study and for the California workforce.
Funds Requested	$3,276,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 88

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	88
Median	88
Standard Deviation	2
Highest	90
Lowest	85
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	13	0
Is the proposal well planned and designed?	12	1
Is the program proposal practical and achievable?	13	0
Has the track record and outcomes of a prior training program demonstrated success?	13	0

Does the proposal have the necessary significance and potential for impact?

- This program has been running over the past 12 years. It is focused on training 10 exceptional and diverse advanced undergraduate, post-baccalaureate, and master students annually to enter the workforce with long-term opportunities in regenerative medicine.
- The program has been full since its inception in 2009. Approximately 70% of the students are first-generation in their families to graduate from college, and more than 80% are members of groups underrepresented in science and medicine.
- The success has been exceptional. Upon completion of their internships, 45% were employed in California as research technicians, 33% continue their studies at the Masters level and 15% are in PhD programs. 7% are health professionals in training and 1% taught science. Greater than 98% of the previous interns are furthering their studies or are employed in the stem cell regenerative medicine workforce.
- The community outreach and other activities in the program are likely to produce graduates committed to careers related to stem cell research/therapy.
- Excellent intern opportunities.
- Strong structured program.
- Good outreach.

Is the proposal well planned and designed?

- Program is extension of highly successful program, with well planned curriculum.
- Students in the post-baccalaureate stem cell program who demonstrate exceptional motivation, reliability and academic ability with the required courses will be encouraged to apply for the stem cell internships. This provides a highly selected and highly motivated starting population.
- The students also will submit monthly written reports, will participate in biannual workshops, and will present at conferences. Progress of the students will be formally evaluated. This provides the students with excellent oversight for their development.
- Activities of the interns will include interaction with patients with unmet medical needs, presentations for current future high school and middle school teachers, and direct contact with community leaders and the general public.
- Courses and training well planned.
- Questionable consideration of diversity.
- Mentoring plan is solid: individual mentoring by institutional advisor and group meetings as well; during internship year, students meet regularly with host PIs and Internship mentor; will get help applying to other programs or jobs.
- Mentorship plan could be better articulated.
- There is some concern about the mentoring plan quality.
- Mentoring plan not well described.

Is the program proposal practical and achievable?

- Trainees will do full-time research for 10 months at one of host institutions: 30 stem cell labs participate - excellent internship opportunities.
- The participating institutions are outstanding, and there are more than 30 affiliated laboratories.
- Students receive list of participating PIs from 3 host institutions and will select labs in consultation with program advisor and internship mentor; then send info to potential mentor, interview, follow-up – this system has apparently provided good matches between mentors and students, with positive feedback from host PIs, and successful recruiting to capacity for past 12 years.
- Good choice of internship mentors.
- The interns will be recruited from the 2000 students in the departments of chemistry and biological sciences, along with qualified students from other institutions.
- The required courses are diverse and well thought out.
- Coursework includes drug development process and regulatory pathways, which includes 18 hours in class and an additional 60 hours of online training.
- The coursework seems to be exceptionally well thought out, including an advanced cell culture techniques course.
- Strong structured application.
- Good training program.
- Adequate personnel and institutional commitment.
- Recruitment plan not well described.

Has the track record and outcomes of a prior training program demonstrated success?

- Program has been full to capacity since 2009; 70% of students are first generation college graduates from their families; 80% from groups under-represented in science and medicine; 98% of all interns either continuing education or employed in stem cell regenerative med workforce: 44% as research techs in CA; 33% in MS and 15% in PhD programs, 7% health professionals; .9% teaching.

- The program has an outstanding record of success in keeping track of undergraduates. People from this program have been placed in multiple positions across the biotechnology and academic spectrum.
- Good track record of placement.
- Track record is only in the appendix, but good.
- Little information on how tracking will be done.
- Not detailed plan on recruitment of underrepresented groups.
- No information on gender inclusivity in the program.
- There is some concern about diversity recruitment.

Application #	EDUC2-12734
Title (as written by the applicant)	Bridges to Stem Cell Research and Therapy: A Talent Development Program for Training Diverse Undergraduates for Careers in Regenerative Medicine
Abstract (as written by the applicant)	Designed specifically for a highly diverse student population, this Bridges program focuses on selecting students who are genuinely interested in advancing the field of regenerative medicine and providing them with high-impact practices such as hands-on research training, product-oriented coursework, one-on-one mentoring, soft skills development, innovative community outreach programs, and personalized patient engagement activities. At least ten biology or biochemistry majors will be selected as scholars annually, for up to 50. Additional funded positions may be available from our partner biotechnology companies. The program has been configured with inclusive practices that lower the barriers to participation: there is no minimum GPA or previous research experience required. There is also an increased emphasis on the applicants' desire to help advance biomedical innovation leading to therapy. Accepted students then benefit from the presence of multiple mentors in the training as well as at the internship sites. The program will consist of a seven-month training on the home campus, followed by a 12-month internship in a stem cell research lab at one of four internship host institutions. Based on our previous success, two biotechnology companies have indicated an interest in sponsoring an intern, which would allow the program to train additional students. All coursework can be applied toward the B.S. in biological science or a minor in cell and molecular biology and thus is fully integrated into B.S. degree programs. The preparatory training on the home campus will consist of 1) five biology courses to strengthen the fundamentals scholars will need for their research internships, 2) an advanced cell culture techniques course taught at the internship site, 3) a hands-on research project in a faculty lab to impart basic knowledge of research lab operations, 4) a proseminar to prepare scholars for internships, 5) patient engagement activities, 6) five workshops to broaden their horizons and soft skills, and 7) community outreach and education activities. The scholars will then engage in a full-time, year-long research internship, carrying out a project focused on development of stem cell-based therapies at a partnering internship host institution, under the direction of a research mentor. All four internship host institutions have been awarded CIRM grants. Through the internships, scholars will gain additional project-specific technical skills as well as the conceptual underpinnings necessary to solve problems in a particular stem cell research area. The overarching goal will be to fulfill all of CIRM's objectives for Bridges 3.0. In the process the program will create a cadre of diverse, highly capable interns who have the knowledge, proficiency, and desire to contribute to the development of stem cell-based therapies and go on to advanced degrees and careers in related fields.
Statement of Benefit to California (as written by the applicant)	CIRM's role in advancing stem cell biology has generated scores of opportunities for biotech innovation and medical revolution in California. The state has become a world leader in regenerative medicine, spawning new companies and creating well-paid jobs that require highly qualified Californians to fill them. Traditional biology curriculum does not provide the broad perspectives or sufficient hands-on experiences to prepare an undergraduate for an entry-level position in a biotech company run by experienced researchers with PhDs. Bridges programs like ours will help address the gap between what an undergraduate student knows and what the biotech companies seek in their new hires. Recognition of our past Bridges interns has prompted company executives to create a path for our interns to join their organizations. Over the next five years, our Bridges program will train 50 or more undergraduate biology and biochemistry majors as scholars and researchers with hands-on training in cell, molecular, and stem cell biology techniques. We will seek undergraduates from our diverse student population who come from different socioeconomic backgrounds and/or are the first in their family to attend college, and then train them to be exceptional interns in the labs of world leaders at our partnering institutions. Many of our Bridges alumni are pursuing advanced degrees, and some

	have already completed doctoral and professional degrees. This, in turn, is likely to increase the number of stem cell investigators and support staff in the future workforce, and having qualified employees will increase innovation and productivity in California's stem cell-based companies. Historically, over 70% of students from this campus remain in California, which means much of the workforce talent will be retained locally. In time, this will likely lead to the translation of discoveries into new therapeutics and diagnostics, benefiting Californians as well as people around the world. Successful stem cell-based companies, staffed by highly qualified scientists and technicians, will also contribute significant tax revenue to the state and enrich California's economy. Moreover, selecting diverse students interested in regenerative medicine will allow underrepresented populations to find employment in one of the fastest-growing sectors of our economy. Their participation is one approach by which communities that have been excluded from high-tech jobs may engage in the future of medicine. This is of enormous benefit to our state because these researchers will be able to bring diverse thoughts, opinions, beliefs, perspectives, and problem-solving skills to the rapidly growing stem cell research enterprise. Our community outreach approaches will also engage large numbers of students and members of the community to learn about advances in stem cell biology, which will help develop an informed citizenry within California.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 88

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	87
Median	88
Standard Deviation	3
Highest	90
Lowest	80
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	14
(1-84): Not recommended for funding	1

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	14	0
Is the program proposal practical and achievable?	14	0

Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- The potential for positive impact is clear from the program outcomes - of 84 alumni, ~25% in biotech, 25% in professional degree programs, 15% grad school.
- A significant number are research assistants in mentor's lab (40%) after graduation, speaking to their positive experience in the mentor's labs.
- The program has two previous CIRM-funded Bridges to Stem Cell Research programs, and longstanding partnerships with over 30 internship mentors at multiple research institutions.
- All four internship host institutions have been awarded CIRM grants.
- Very strong implementation of practices that support students from diverse backgrounds. For example, emphasis on selecting trainees based on potential rather than past experiences.
- The curriculum is fully integrated into the Bachelors Degree in biological science. More emphasis will be placed on proposed gene therapy and other novel approaches to curing diseases in the curriculum.
- Preparatory training on the home campus: 5 biology courses, one advanced cell culture techniques course taught at the internship site, hands-on research project in a faculty lab, one seminar to prepare scholars for internships, patient engagement activities, 5 workshops, community outreach and education activities.
- Course on advanced cell culture techniques is not the same for all students.
- Potential involvement of two companies in training interns is a positive - very supportive letters, but not yet clear if this will work out.
- Details of industry involvement are not provided.

Is the proposal well planned and designed?

- The program is well structured - some new aspects are interesting, including the further development of virtual library of patient experiences that students started assembling during COVID.
- Community outreach activities are excellent and include innovative aspects such as work with instructors in the institution's game-based learning certificate program to develop e-games and digital worlds in Minecraft.
- Outreach and engagement approaches are creative. Internship matching plan is good. The gaming educational component is creative.
- Electronic training opportunities good.
- For community outreach and education, scholars will educate K-12 students, students at the home institution, and citizens worldwide about stem cells, gene therapy, and regenerative medicine through e-learning content on the Minecraft platform, generate material for a course, participate in microscopy outreach events for K-9 students, social media post, present their internship projects at the Regenerative Medicine symposium.
- Patient and healthcare engagement includes direct patient engagement with a self-reflection writing assignment, seminars with patient advocates, curation of a virtual library of patient experience.
- Scholars must volunteer for at least 40 hours during their seven-month training in assisted-care facilities, low-cost/free medical clinics, and hospital emergency rooms.
- Examples of students' reflection on patient engagement experience are provided.
- Students attend at least five presentations and discussions with patient advocates during their 19-month experience.
- Educational enhancement includes 5 courses covering stem cell literature; mastery of basic cell, molecular, and stem cell biology techniques; ability to plan their research and troubleshoot; and practice to effectively communicate their research and internship plans; mini-courses on data science, regulatory affairs, and ethics.
- Applicant institution is a federally designated Hispanic-Serving Institution.
- 56.6% of undergraduate biology majors are Pell grant recipients (a measure of low household income) and 51.9% are first generation to college degree (Fall 2019). For the Bridges program: 51.1% Pell grant recipients and 39.8% first generation to college degree.
- Bridges program has embraced DEI principles and lowered barriers to participation: no minimum GPA or previous research experience is required.
- Inclusive practices include eliminating the summer tuition cost, partnering with the Office of Special Populations to conduct outreach and recruitment efforts to get first-generation students and other Special Populations students.
- Selection criteria will focus more on critical thinking, scientific communication skills, and interest instead of academic record.
- The Program Director and Internship Coordinator will guide the scholars on how to select the best internship labs from the partnering sites based on the students' own research interests and institutional preferences.
- Interactions with multiple mentors is a strength —the program director, internship coordinator, and the Bridges coach. The coordinator monitors interns' progress every two weeks and collects monthly updates from the mentors.
- Scholars will take the lead in communicating with the mentor labs to schedule interviews. Scholars must interview with at least two labs, spend time with lab members and meet with at least two potential internship mentors.

- Students will attend a hands-on advanced cell culture techniques course selected by the host institution PI. However, the Advanced Cell Culture Techniques Course is not taught at the home institution.
- The program provides workshops to 1) generate a CV and LinkedIn profile and 2) learn the interview procedure and type of information that should be collected.
- Interns will also present their research to subsequent cohorts in June.
- The program outcomes will continue to be assessed by external evaluator.
- Course work does not include training on interdisciplinary research such as bioengineering.
- Activities for networking with industry are not mentioned.

Is the program proposal practical and achievable?

- The recruitment plan is solid, and is identifying students that benefit from the program. One interesting aspect is the goal to identify promising students with low GPA during the interview process – the program description gives one example of success, but not clear how many students fit this profile, which is highlighted as a special feature of the recruitment process, so some more details on how many students are recruited this way, and their success would be helpful.
- Strengths include the Program Director and key persons with established expertise, two advisory committees, and partnership with over 30 internship mentors various research institutions.
- Program Director has led the Bridges program since its inception in 2010 and has developed most of the curriculum. Program Director is also a member of the Americans for Cures' Patient and Medical Advocacy Committee, and has received a college award for student success and institution-wide recognition three times.
- Identified key person for managing intern-internship lab relationship; twice awarded recognition for contributions to student success and chosen to serve on a college committee to address diversity, equity, and inclusion issues in research spaces.
- Strong LOS from the president of the institution.
- Inclusive practices that lower the barriers to participation: there is no minimum GPA or previous research experience required.
- Selection based on candidates' previous biology experiments in lab courses, knowledge of foundational concepts in biology, critical thinking, communication skills, understanding of experimental design, and academic performance.
- Outreach and recruitment activities include a public Regenerative Medicine symposium a month before applications are due, announcements in relevant classes, information sessions and application workshops. Multiple applicants to the program cite an intern poster or expert presentation as a reason for applying.
- The program filled 100 of its 110 internship positions (91%) over the last 11 years.
- A new partnership has been formed with institution's Special Populations team, which is home to 12 programs, 3 of which exclusively serve undergraduates who are first-generation, low-income, and/or have disabilities.
- Advertise the program to students in other programs serving underrepresented students, research preparatory programs, student clubs, relevant courses.
- There are some concerns about approaches for recruitment of students into this program. There are also concerns about assessment strategies.

Has the track record and outcomes of a prior training program demonstrated success?

- Outcomes data are very positive.
- Substantial diversity.
- Good publication record from students, good placements.
- The scholars completed three anonymous surveys: during the first week of their stem cell coursework, at the end of their training at the institution, and post-internship near the end of their internship: The vast majority (91%) considered it to be "above average" or "well above average" in preparing them for their internship, while only 66% felt the same way about the traditional biology curriculum.
- Survey on confidence in 10 skills required of a successful stem cell researcher: More than 80% were "confident" or "very confident" about the skills.
- Survey by internship mentors to compare Bridges students with other undergraduate students they have mentored: More than half of the mentors responded "well above expectations" over the past 11 years, including the current cohort of interns.
- 51.1% interns have been Pell grant recipients (a measure of low household income) and 39.8% have been first generation to college degree.
- 40% of alumni were hired by their internship lab as research associates after graduation. Of these 24% are MD/DO/DMD; 15% are in graduate school or are postdoctoral fellows; 24% are in biotech; 7% have specialized degrees or careers; and 7% are research associates or lab managers in academia. 37% of these alumni have also been recognized with awards.
- 42% have published 82 articles with their mentors.

Application #	EDUC2-12695
Title (as written by the applicant)	CIRM Graduate Student Training in Stem Cell Sciences in the Stem Cell Technology and Lab Management Emphasis of the MS Biotechnology Program
Abstract (as written by the applicant)	Our institution has led the way in developing the most successful professional biotechnology master's program in the university system, as well as an innovative Master of Science (MS) Biotechnology and MBA dual degree program. The degree structure permits students to custom-design their curriculum under an advisor's guidance, making the degree especially relevant for students employed in today's diverse biotechnology workplace. Together, these programs have a current enrollment of regionally and demographically diverse students. The applicant campus has graduated 428 MS students; all are either employed in the biotech industry, academic sector or pursuing doctoral degrees. In the past six years, 122 students have been extensively trained in stem cell sciences within the Stem Cell Technology and Lab Management (SCTLM) emphasis as a result of a robust curriculum and partnerships with 16 different institutions providing year-long internship opportunities to CI students. With a curriculum requiring students to take cutting-edge courses in the areas of molecular sciences, genomics, proteomics, quality assurance, biotech law, management and stem cell techniques, the applicant campus's students are assured of receiving excellent training. For the training program in this emphasis, each year 10 MS Biotechnology students will be supported by CIRM for a total of 75 interns over 5 years. Because the team has well-established collaborative relationships with local biotechnology firms and research institutions, the instructors include not only academic faculty, but also senior scientists, professionals, and experienced business managers at local biotech companies. The applicant campus is committed to continuing this innovative public-private partnership in support of the MS Biotechnology program and the stem cell emphasis in particular. Through innovative programs embedded within the applicant campus's curriculum important career tracks are provided for students in the STEM disciplines with the potential to become one of the most successful and sustainable programs in the university system; a key contributor to fulfilling a critical need for highly qualified technical and managerial personnel in stem cell research technology. Continuation of this training program will directly make a key contribution to the stem cell efforts supported by the people of California as evidenced by the applicant campus's interns' interest in pursuing future research in the stem cell areas either via seeking employment in the R & D sectors of stem cell based biotech companies or via applying to a PhD program. Our interns have spoken at community events held on our campus and increased the transparency of the SCTLM emphasis and CIRM funded research. This training program has gained tremendous popularity on the applicant campus in the past several years and future support will prove to be instrumental in recruiting the best students to augment the California scientific workforce.
Statement of Benefit to California (as written by the applicant)	Students completing the stem cell emphasis in our MS Biotechnology degree will be qualified to pursue careers that require knowledge of state-of-the-art scientific principles and knowledge underlying advances in biotechnology along with legal and intellectual property issues. The program is not only comprehensive, but prepares the students to be effective managers in biotechnology-related companies, agencies and organizations by giving them the knowledge and skills needed to advance in science and business roles, thus directly benefiting the state of California in a variety of professions. Our Master of Science in Biotechnology and Master of Business Administration is an innovative dual degree program that blends key components of biological sciences and business at the graduate level. Students receiving training in the stem cell sciences and completing an MBA will directly contribute to the regional and national needs of a well-educated workforce in the stem cell technology industry which is subject to heavy layers of regulation. The proposed program will enable us to provide extensive stem cell training to our students in world-class labs, allowing them to learn sophisticated stem cell techniques under the tutelage of experts and work on projects directly contributing to the study, treatment and potential cure of diseases. In addition to didactic training, students will receive opportunities to interact with health advocacy groups and patients, thus enabling them experience with the non-classroom component of the program. Students will be able to enhance the visibility of stem cell research and potential therapies via a variety of community outreach events, thus

	bridging the gap in the transfer of knowledge from lab to California citizenry. As a result of its rigor and quality, the training program will provide a highly rewarding scientific experience to our interns. Since 2004, CIRM has handed out (as of June 2020) $2.7 billion in grants to California scientists studying a variety of diseases, including diabetes, AIDS and leukemia. It has built several research facilities, funded more than 60 clinical trials and helped create more than 56,500 jobs in the state. The California workforce is directly benefited as a result of influx of skilled stem cell researchers in the market. This is a clear reflection of how a training program dedicated to students is capable of reaping big benefits. California is now home to the largest publicly available stem cell bank in the world and maintenance of these cell lines requires personnel who have received adequate and comprehensive training. These cell lines are valuable in understanding and modeling human diseases as well as in the areas of regenerative medicine. Students funded by the proposed training program will play a major role in enhancing California's image in the stem cell areas and educating the citizens about the promising potential of stem cells.
Funds Requested	$3,606,500
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG." Patient advocate members unanimously affirmed that "The review was carried out in a fair manner and was free from undue bias."

SCORING DATA

Final Score: 85

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	85
Median	85
Standard Deviation	1
Highest	88
Lowest	85
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	15
(1-84): Not recommended for funding	0

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	14	0
Is the proposal well planned and designed?	12	2
Is the program proposal practical and achievable?	13	1
Has the track record and outcomes of a prior training program demonstrated success?	14	0

Does the proposal have the necessary significance and potential for impact?

- Good program with a good training record.
- Excellent previous outcomes.
- Reasonable track record, but notable weaknesses in inclusion of trainees that represent the broad diversity of the college's student body.
- There need to be efforts to increase a more diverse pool of trainees. Retool the recruitment plan.
- Not enough detail about biotech opportunities.

Is the proposal well planned and designed?

- Program was previously established and demonstrated to be successful.
- Great training program and good internship partners.
- There is placement for internships in many external entities.
- Curriculum includes both course work and internships in world-class academic institutions.
- Course work includes also hands-on labs and a course on lab management.
- Students can custom-design their curriculum.
- Course work does not include sufficient bioengineering training.
- Detailed description of Educational Enhancement Activities, Advanced Cell Culture Techniques Course, Patient/Patient Advocate and Healthcare Engagement Activities, Community Outreach and Education Activities are provided.
- More interactions with biotech industry would be beneficial.
- It's mentioned that trainees will also be able to interact one-on-one with industry representatives but details are not provided.
- Mentoring at a variety of levels: from the instructor for the internship course, the Program Director and the Research mentors at the host institutions.
- Mentoring plan will be reviewed each year by the Program Advisory Committee. A survey, after trainees have completed the stem cell program, will be conducted to seek suggestions for improving the mentoring experience.
- Trainees will be given an opportunity to attend the Career Networking session at the annual symposium.
- Career workshop at the end of the trainees' internships.
- Student graduation rate and placement after graduation are monitored. Mechanisms and procedures for tracking trainee progress after completing the program are not described in detail.
- More than 60% of the students in the program are the first in their families to attend college, 58% come from Historically Under Represented Groups, and more than 80% receive financial aid.
- University received the inaugural Seal of Excelencia from the Washington, DC-based Excelencia in Education for the University's commitment to serving a majority Hispanic/Latinx student population.
- Involved in the Graduation Initiative 2025, a system-wide initiative to increase graduation rates and eliminate equity gaps
- Efforts to incorporate perspectives from individuals with diverse experience and from underserved groups are clearly described.
- DEI plan is very generic. A DEI "plan" was included but it reads more like a list of things that have been/will be done. No details on how the list of "efforts" was, or will be, accomplished.
- GRE may not be an ideal measure of success for incoming applicants.
- There was some details lacking in the plan of the program. There were many listings of efforts but it wasn't clear how these connect to each other.
- Diversity of trainees appears poor compared to the possible input pool.
- DEI plan not well articulated.
- Incomplete description of program components, particularly how the impact of each component will be evaluated.

Is the program proposal practical and achievable?

- Established partnerships with 16 different institutions for internship.
- Designated lab space for hands-on activities and additional space available from partnership with dedicated personnel.
- Strong letter from president showing institutional commitment.
- Means and strategies for student recruitment are appropriate through outreach and marketing and include a selection committee composed of diverse individuals, representative of all ethnicities, race and status.
- Program Director, grant administrator, mentors, course teachers are strengths.
- Program Director has been serving as the Program Director for the Bridges Training grant since June 2012.
- PD has no other support.

- Weakness in description of mentor research areas. Details on mentors (areas of expertise) at partnering institutions for internships are lacking.
- Details on initiatives for targeting trainees that come from socioeconomically disadvantaged communities or are first generation college students, who have overcome multiple barriers, primarily educational, emotional and physical are not provided.
- Career development activities appear to be optional.
- It appears that assessment of the entire program is planned to be developed but is not currently in place. No details are provided on how this will be developed or what it will measure.
- The program will need to improve its plan for assessment. Plans for assessment are unclear.
- Focus more on achievements rather than lists.
- Has the experience and should be achievable.

Has the track record and outcomes of a prior training program demonstrated success?

- Good track record: 100% graduation rate for this specific emphasis and have graduated a total of 135 students since 2009 and another 9 will graduate this year, bringing the total to 144.
- Received first CIRM Bridges award in 2009 which ended in 2016. Received the EDUC2 Bridges award in 2016 which is ending this year.
- Trend over the past 10 years indicates that a majority (average of 68%) of their stem cell trainees enter the industry as research associates, research scientists and technicians. An average of 20% of the trainees are placed in academic jobs involving research, while about 10% pursue PhD programs.
- Interns have also been the recipients of a number of awards and scholarships.
- Outstanding previous successes.
- There is a history of the program, but it needs some improving.
- Track record is good but gender diversity is hard to assess.
- Efforts should be increased to achieve representation of all groups at levels seen in the state so that they truly represent the communities that will be served in the future by these highly skilled professionals. As indicated in the proposal "All efforts will be made to select students from a diverse population, with an emphasis on under-represented minority students". This should be reflected in the future with higher percentages of participants from these groups in the future.
- Track records do not show recruitment of underrepresented groups.
- Track record shows all students not only the CIRM-funded ones.
- I do not see a plan to track trainees after they leave the program in the current application.
- Publication record of trainees of 23 publications in 10 years is not outstanding.
- Number of applicants is not specified.
- Provide more data on outcomes.
- Some questions about outcomes data.

Application #	EDUC2-12730
Title (as written by the applicant)	Building Career Pathways into Stem Cell Research and Therapy Development
Abstract (as written by the applicant)	The proposed project will build on a robust stem cell technician training program already in place at the home institution, expanding and enhancing student training with a translational focus through the implementation of 8 internship experiences each year as well as a range of other support activities. Specifically, the proposed project will: • Offer full-time internships to 8 students each year in CIRM-funded research laboratories or industry labs working on translational stem cell research. Participating laboratories include both academic and industry labs throughout the region. Intern trainees will be recruited from the pool of students who have completed a series of cell culture courses at the home institution and will engage in a ten-month internship for which they will earn college credit. • Offer a stem cell techniques course that will prepare trainees to begin their internship experiences. • Mentor trainees through 2 four-unit independent study courses in both the fall and spring semesters. • Augment and update all existing cell culture courses with cutting-edge information, techniques, and equipment, including coursework regarding drug and therapy development compliance and regulations. • Build a network that allows research scientists in the field the opportunity to be guest lecturers and/or teach a laboratory to enhance the learning experience of the students in our program. • Engage a Project Director whose long-term experience in molecular biology and cell culture research will fully qualify her to implement the proposed project. The proposed program will greatly enhance the training of future stem cell laboratory personnel by augmenting the existing community college program with hands-on experience at an academic or industry laboratory over a ten-month period. Students participating in this internship will gain a robust set of skills that will allow them to enter the workforce and make a substantial contribution to stem cell research. Furthermore, by enhancing partnerships between the home institution and regional academic and industry laboratories, the proposed project will pave the way for future student training and professional development activities for faculty members.
Statement of Benefit to California (as written by the applicant)	The proposed program will benefit the state of California and its citizens by providing high-quality training to a cadre of future stem cell research technicians, with a focus on translational research. Over the five-year funding period, the proposed program will greatly enhance the training of future stem cell laboratory personnel by augmenting the existing community college program with hands-on experience at an academic or industry laboratory over a ten-month period. Students participating in this internship will gain a robust set of skills that will allow them to enter the workforce and make a substantial contribution to stem cell research. Furthermore, by enhancing partnerships between the community college and regional academic and industry laboratories, patients, and local high schools,the proposed project will pave the way for future student training, professional development activities for faculty members, and much more.
Funds Requested	$2,706,200
GWG Recommendation	***(85-100): Exceptional merit and warrants funding, if funds are available***
Process Vote	All GWG members unanimously affirmed that “The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG.” Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: 85

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	85
Median	85
Standard Deviation	3
Highest	90
Lowest	80
Count	14
(85-100): Exceptional merit and warrants funding, if funds are available	12
(1-84): Not recommended for funding	2

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel's discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	13	0
Is the proposal well planned and designed?	11	2
Is the program proposal practical and achievable?	13	0
Has the track record and outcomes of a prior training program demonstrated success?	13	0

Does the proposal have the necessary significance and potential for impact?

- The focus on community college students provides a workforce in high demand in the cell therapy industry.
- The program is integrated into other related training programs. Graduates will earn a Biotechnology certificate with a Stem Cell focus.
- This is a good community college-oriented program.
- Letters of support from investigators speak to quality of students.
- The program is clearly focused on hand-on training needed by industry.
- Generally strong program but with the availability of only three research mentors (one at each host site), it has limited potential to have as much impact as it could. For example, potential trainees may not be interested in the work these labs are doing. In contrast, there could be benefits in placing multiple trainees into the same lab - but these benefits are not articulated.
- Application generally lacks specific details in many areas. For example, new focus on translational research, but details not clear.
- Specific figures regarding DEI lacking.
- The plan to recruit diverse populations is vague and needs to be strengthened.

Is the proposal well planned and designed?

- Programmatic details are well-considered. Formal courses, professional development activities, and internships are integrated.
- Alumni engagement is a strength.
- Workplace navigation skills is a well-considered approach to acclimate students from diverse backgrounds to research environment.
- For DEI, focus on inclusion with modules on navigation through workplace environment.
- Strong inclusion plan.
- Use of social media for outreach is a good idea.
- Stem Cell Techniques Course taught by experienced person at research university.
- Details on how the curriculum will be updated are lacking.
- Clear support for internships at a number of relevant labs. Provides coursework for doing internship.
- The program has strong pipeline to 3 internship hosts. The program would be strengthened by broader internship opportunities, however, particularly in industry.
- Only three partner institutes currently engaged. Limited number of mentors and partner institutions relative to other applications, some mentors named in application narrative do not appear in listing at end. 2 of 3 mentors in same field. Poor offering given the institution area.

• Only three mentors despite great local opportunities. • Should expand industry involvement. • Details on translational training are missing. • There are some concerns about the overall program due to somewhat vague writing in places.
Is the program proposal practical and achievable?
• Strong commitment from institution. • Good Advisory Board with representation from academia and biotech. • Alumni participation in the program is a strength. • Program Director is a strength. • Not enough details on high school recruitment plan. • Mentor-mentee relationship poorly described. • The program would benefit from better tracking of alumni.
Has the track record and outcomes of a prior training program demonstrated success?
• Track record of 94 trainees; 84% of trainees in stem cell or biotech, 16% higher degrees. • Alumni have been very successful in both industry and academic settings. • Good results with former trainees. • Successful alumni. • Positive letters of support from previous mentors. • Good history of tracking is provided. • Tracking data on diversity are lacking. • Lack of data on diversity among students. • No mention of gender distribution in outcomes or recruitment.

Application #	EDUC2-12738
Title (as written by the applicant)	CIRM Bridges to Stem Cell Research and Therapy
Abstract (as written by the applicant)	The CIRM program in stem cell research and therapy will prepare students, including many from underrepresented and underserved communities, for jobs and careers in biology and biotechnology. The numbers of industries and laboratories centered in production and research on stem cells and gene therapies has steadily risen in California over the past few years as new and innovative therapies are in demand. To meet the needs of this industry and the research labs that support it, there will be a greater need for highly trained technicians. Also, there will be a need for more scientists and entrepreneurs to develop the therapies of the future. Students who have the opportunity to work in laboratories early in their careers are inspired to continue their education, a few earning advanced degrees who will enter the workforce as scientists and entrepreneurs and contribute directly to future endeavors in this arena. This program provides hands-on laboratory experience as well as academic instruction, and affords students a solid foundation for future studies and employment opportunities. Laboratories willing to host student interns are engaged in a range of endeavors from basic research into the origins of disease to the generation of gene therapies. Among opportunities afforded by this internship, students will receive world class training in working with stem cells and advanced technologies. As part of their training, interns will attend symposia pertinent to their research interests along with seminars that address ethical and legal issues associated with medical advances. Interns will learn how pharmaceuticals are created, developed and regulated and thus be capable of understanding the challenges of developing new therapies. In the course of a 10-month internship, students will work alongside top scientists and technicians honing their laboratory skills and developing critical thinking skills and confidence in their ability to work in today's world of biological science, which can be daunting when viewed from the outside. Interns also will hear from patients and their families what it is like to struggle daily with debilitating conditions such as Alzheimer's, Parkinson's and chronic myeloid leukemia. Witnessing personal stories and connecting with patients with genetic-based conditions will deepen the appreciation for translational research and therapies. CIRM interns will be invited as guest lecturers in biology and biotechnology classes offered at their own and other local colleges, high schools, community centers and health clinics. Participation in outreach will allow interns to share their experiences and inspire and educate not only other students, but members of the community in the new and exciting fields of medical research and innovative gene-based therapies.
Statement of Benefit to California (as written by the applicant)	Developing and maintaining leadership in the field of stem cell research and gene therapies requires a critical mass of exceptional scientists, adequate resources, laboratories equipped with the latest specialized technology required for stem cell research, and a large pool of laboratory technicians trained in handling cell and stem cell research techniques. The proposed CIRM Bridges program in Stem Cell Research and Therapy will benefit the State of California by providing skilled technicians to work in the field of gene therapy and stem cell biology. Due to the cost of equipment and materials, much of the required training in this field is not available in 4-year and community colleges, so the inclusion of on-site internships as part of the training program is critical. The proposed program will ensure that students not only gain the technical skills needed to meet the needs of the workplace, but also acquire an understanding of the challenges faced by patients diagnosed with genetic-based and degenerative conditions. Students also will be exposed to the legal, ethical, and social issues surrounding stem cell research and gene-based therapies and will be encouraged to participate in outreach activities in their communities. Importantly, this proposal will encourage and prepare students from non-traditional and underrepresented backgrounds to participate in the program and to consider careers in industry and research laboratories dedicated to understanding the origins of genetic-based conditions and the use of gene-based therapies to resolve them.
Funds Requested	$2,806,896
GWG Recommendation	***(1-84): Not recommended for funding***
Process Vote	All GWG members unanimously affirmed that "The review was scientifically rigorous, there was sufficient time for all viewpoints to be heard, and the scores reflect the recommendation of the GWG."

	Patient advocate members unanimously affirmed that “The review was carried out in a fair manner and was free from undue bias.”

SCORING DATA

Final Score: --

Up to 15 scientific members of the GWG score each application. The final score for an application is the median of the individual member scores. Additional parameters related to the score are shown below.

Mean	--
Median	--
Standard Deviation	--
Highest	--
Lowest	--
Count	15
(85-100): Exceptional merit and warrants funding, if funds are available	1
(1-84): Not recommended for funding	14

KEY QUESTIONS AND COMMENTS

Proposals were evaluated and scored based on the key questions shown below, which are also described in the PA. Following the panel’s discussion and scoring of the application, the scientific members of the GWG were asked to indicate whether the application addressed the key question and provide brief comments assessing the application in the context of each key question. The responses were provided by multiple reviewers and compiled and edited by CIRM for clarity.

Key Question	Yes	No
Does the proposal have the necessary significance and potential for impact?	9	5
Is the proposal well planned and designed?	12	2
Is the program proposal practical and achievable?	5	9
Has the track record and outcomes of a prior training program demonstrated success?	9	5

Does the proposal have the necessary significance and potential for impact?

- In its first iteration of having a CIRM award, the program reported successes.
- The program considers the impact of the student's selection as a trainee on the student's family and community. This approach represents a highly effective inclusive practice. However, the track record in and plan to recruit diverse trainees is not strong.
- The potential for impact is adequate but modest, and impacted by the program design to an extent.
- The current version contains many vague statements about what could be developed.
- It appears that many of the activities are not in place to run a successful program.
- Concerns with faculty expertise in stem cell science.
- Recruitment plans need to be more clear.
- DEI plan poorly articulated.

Is the proposal well planned and designed?

- Scientific writing and communication emphasis good.
- The program is lacking some detail which is a cause of concern for a successful program.
- There appears to be a number of parts of the program that have not been thought through.
- Specific plans were not provided.
- List of internship labs that agreed to host students is not defined.
- Adequate, but there are concerns about asking students to see after self-placement in internships.
- The PI notes that once a trainee identified a lab that they are interested in that the Program Director will then approach the lab to ask if they want to be in the Bridges Program. This appears to not be very efficient as students could choose labs that have no interest in hosting them. This is a major issue.
- No potential research hosts are listed. Without established research mentors, the program is unlikely to be successful. The proposal misses an essential first step.

- No pre-approved list of mentors.
- Poor plan for placement.
- The curriculum is fine, but looks mostly drawn from existing biology coursework, with no special emphasis on stem cells.
- Some of the courses listed (biotech courses) are not related to stem cells. These appear to be a list of courses for the major, but are not specific for the Bridges program.
- No clear plan for recruiting diverse students. General statement is included that notes that “other” opportunities will be developed in future years.
- DEI component is lacking.
- Career opportunities not well planned.
- Career development plan underdone.
- The PD notes that trainees will be “encouraged to start thinking about their next steps”. This is very vague.
- Students will be “encouraged to attend seminars and workshops” and “encouraged” to set up zoom meetings with classmates to share info on the job market. A formal process needs to be in place.
- A general statement is included that notes that “other” opportunities will be developed in future years.

Is the program proposal practical and achievable?

- The program can be accomplished but there are numerous parts that are not developed.
- The proposal does not have sufficient information to support its likely success.
- The program description is vague making it a challenge to determine its practicality.
- Specifics of planning for the program are lacking.
- Trainees are responsible to find labs for placement.
- Yes, but many students may fall out, especially ones who cannot entirely navigate self-placement.
- Future plans are not defined (how students will get jobs).
- More details on Program Director's background would be useful.

Has the track record and outcomes of a prior training program demonstrated success?

- Most students have been placed in appropriate posts.
- Good past track record.
- The prior program provided training for 45 students, who have pursued biomedical careers/career paths.
- 80% of trainees in previous funding period transitioned to continue in science- the % related to stem cell science is unclear.
- The track record is mixed due to its lapse in funding.
- Some concerns about a lapse in funding.