COMPUTER SCIENCE, ENGINEERING AND
MATHEMATICS SCHOLARSHIPS AT FIU

GENERAL IDEA OF THE CSEMS PROPOSAL

The general idea behind this proposal is to provide scholarships in the fields of Computer Science, Mathematics and Engineering and a support mechanism for two different groups of students; one of incoming freshmen and a second one of transfer students (incoming as college juniors) which qualify for this program, with the final goal of graduating them with a Bachelor’s degree and in addition, a Master’s degree for the second group. Since our two main feeder institutions have a large minority student population, we expect a large percentage of the participating students to be minority students, especially Hispanic. The PI of this proposal, Dr. Enrique Villamor, is the Chair of the HSI (Hispanic Serving Institution) Task Force which oversees the University’s efforts in increasing the retention rates of Hispanic students. The University has recently sent an HSI Title V proposal to the Department of Education which is currently under review. The present proposal builds on these retention activities.

In close collaboration with our two feeder institutions, Coral Park Senior High School (CPSHS) and Miami Dade Community College (MDCC), and the Offices of Admissions and Financial Aid at FIU we will identify during the second half of the Summer 2002 semester two groups of students. The first, incoming freshmen from CPSHS (and possibly other Miami Dade high schools); and the second, transfer students from MDCC (and possibly other Florida community colleges) coming to FIU with 60 credit hours. The total number of students among both groups we expect to be around 40. Because of the higher risk of attrition among the High School students, we will assign approximately 15 scholarships for CPSHS students and 25 for MDCC students.

If minorities are underrepresented in the CS, MATH and ENG areas, females and minority females are even more underrepresented in the same areas. Extra efforts will be made so that at least 30% of those 40 students will be female students. We will work closely with both CPSHS and MDCC with this goal in mind. These numbers may vary depending on the amount of the scholarships. These amounts for each individual student will be based both on academic merit and financial need, but always keeping on mind our goal of the students being full-time students throughout the duration of the program. All those factors will make those amounts variable and that will affect the total number of scholarships available.

We have established partnerships with Coral Park Senior High School and Miami Dade Community College to identify some of their best Computer Science, Engineering and Mathematics students who qualify for this program in order to recruit them to come to FIU to complete their Bachelor’s degree in the case of the CPSHS students, and to finish their last two years of their Bachelor’s degree and continue for a Master’s degree in the three areas of Computer Science (CS), Mathematics (MATH) and Engineering (ENG), in the case of the MDCC transfer students (see letters of collaboration in the Special Information and Supplementary Documentation section).

We have estimated that between those two institutions (CPSHS and MDCC) there will
be more than enough qualifying students to award all the scholarships the CSEMS program permits. Although the program may seem to have a largely local impact, we decided to go this way since we think these two institutions are largely made up not only of students in need but also of minorities who are underrepresented in the CS, the MATH, and the ENG fields, making them suitable targets for this program.

In addition to that, we will contact other Miami Dade High Schools and Florida Community Colleges to inform them about the CSEMS scholarships. All the applications received from those institutions will be treated on an equal basis with the CPSHS and MDCC applications.

Contacts have already been established with CPSHS and MDCC to identify some of their best qualified students who have financial need and either have intention of majoring in one of the three fields of CS, MATH or ENG, for the CPSHS students, or have declared majors in the same fields, for the MDCC transfer students. The administration at both CPSHS and MDCC will facilitate this recruitment (see letters of collaboration) by identifying the students interested in coming to FIU and having an interest in majoring in the three fields of CS, MATH and ENG. Once those students have been identified they will be asked to fill out a Free Application for Federal Student Aid form with the purpose of determining their need. Those forms will be forwarded to our Senior Assistant Ms. Maria Tolon, Associate Director of FIU Financial Aid Office, who will determine according to FIU tables the need factor of the students. At the same time and with the collaboration of CPSHS and MDCC administration, the Principal Investigators and Senior Assistants will have to design a schedule to interview those students with the double purpose of recruitment and selection.

Florida International University’s student body consists of 32,196 students as of the Spring 2001, of which only the equivalent of 18,207 are full-time. This shows that many of our students are part-time. Many of these students fit the following profile: minority (mostly Hispanic) local student living at home with his/her parents, needing to work at least part-time (in many cases full-time) to contribute to the household income in order to make ends meet and being able to afford a higher education. Being part-time students represents a tremendous toll in their studies, especially if they are majoring in fields such as Computer Science, Engineering and Mathematics. The main reason for being part-time students is financial. Most of them can not afford to attend school full-time without working. It would be ideal to be able to entice those students to come to FIU as full-time students. This will have three clear and great benefits for them:

- First, in terms of retention and attrition (see FIU Retention and Graduation rates for CS, MATH and ENG below). It is known that part-time students are more at risk of dropping out than full-time students.
- Second, academic achievement (generally full-time students in those fields have higher GPA’s than the part-timers).
- Third, length of degree completion and starting of their productive careers.

As one of many side effects of being able to be full-time students, we believe that these (full-time) students are more likely to be molded into potential graduate school material, because of the continuity of their education without the work component, and because in general, those students (if properly monitored and mentored) are being more exposed to academia and research. Thus, they get a more complete educational package and acquiring a better understanding of their discipline.
Another important step in our project is the implementation, once the students are here at FIU, of a monitoring and mentoring program. A faculty member in the respective discipline will be assigned to each of the students. This faculty member will have the ultimate mission of retaining the student until he or she successfully graduates. As part of this mentoring program, the faculty will meet with the student once every week during the semester and during every semester’s registration period. On their first meeting the faculty will individually advise the student on the load they will take that semester and inform them about the courses they will be taking (level of difficulty, requirements, etc), also providing constructive input, whenever known, about the different instructors teaching the same course, and when unknown, providing students with directions where to get that information (FIU has each instructor’s student evaluations available through its webpage). The incoming freshmen students will be placed in the FIG’s (Freshmen Interest Groups) program at FIU. This program is an Undergraduate Education Enhancement program launched at FIU in the Fall 1999. Students in this FIG’s program enroll during the Fall and Spring semesters of their freshmen year in a group of classes team taught by two different instructors in two related disciplines (e.g. Mathematics and Business). All the students in the same FIG are taking the same enhanced courses. Mr. Jeffrey Knapp, the Director of the FIG’s program at FIU, will collaborate with us in placing our students in those FIG groups during their freshman year at FIU.

During the earlier meetings, the faculty mentor/student meetings, the faculty mentor’s mission will be to determine how the student is coping with the everyday life at the University. During those weekly meetings, the faculty mentor will go in depth with the student to find out how he/she is doing so far and according to the findings either encourage them to keep up the good work or design a program with the final purpose of remediating the student’s difficulties, so that the student will successfully complete the semester both academically and personally. It is important that the faculty mentor reaches an important level of confidentiality with the student. All throughout the semester, it is intended that the faculty try to find out the kind of learning experience the student is having and inform the student about what is next in line. Always the goal is making the student’s overall college experience as enriching as possible.

The faculty mentor will keep a file for each of the students he/she is advising. In those files he/she will include information after each of their meetings.

There are enough faculty members in CS, MATH and ENG willing to participate in this mentoring program so that each participating faculty will not have more than two students assigned to him/her at any given time. This will make these weekly mentoring contacts manageable and easy to fit in their weekly schedule.

This effort builds upon two already existing programs at FIU, the multiyear NSF FGAMP Florida-Georgia Alliance for Minority Participation in the Sciences, Engineering and Mathematics (see a description of this activity and its goals in the Special Information and Supplementary Documentation section of this proposal) and the 4 year, $1,500,000 Kellogg Foundation ENLACE initiative in Hispanic Higher Education.

The PI has been actively participating and collaborating in the FGAMP program for the last 4 years as both student mentor (summer research experiences in Mathematics) and judge in local and state FGAMP activities. He is also a Co-PI in the ENLACE initiative, in charge of providing support to the participating students to succeed in Mathematics and in making their college experience one which will serve them well to become good professional and better human beings.
Another important part of our program consists in requiring an Internship experience for all the participating undergraduate and graduate students. Our Internship program is two fold:

For all our undergraduate students, we have established a partnership with the Career Services office at FIU to take advantage of their Internship/Co-Op program (one of the Senior Assistant’s in this proposal, Ms. Dulce Damon, is one of the Assistant Directors in that office). Although there are limited opportunities in government and industrial labs in the South Florida area, there are enough companies to provide all the participating students with Internship/Co-Op opportunities (see list of companies with ties to FIU in the Director of FIU Career Services letter in the Special Information and Supplementary Documentation section).

The participating students will be required in their junior and senior years to take at least a total of 9 Internship/Co-Op credit hours. Students will be interning in companies working on fields and areas close to their professional interest. Many of our students are already taking advantage of the FIU Internship/Co-Op program, being recruited for full-time employment upon graduation by the companies for which they interned. This will provide the students with an excellent job placement opportunity. This first type of Internship/Co-Op is intended for those students who are planning to join the work force upon graduation. It will give them a hands-on experience in the type of work they will be doing after graduation, and possibly in many cases it will provide them with their first job with the host company.

The second type of Internship, intended for those students thinking about going to graduate school, will be at Universities (REU/NSF-Research Experiences for Undergraduates and similar programs), National Laboratories, FIU Labs/Institutes/Centers and companies with research labs on their fields of choice (see letters of collaboration in the Special Information and Supplementary Documentation section). These experiences will reinforce their intentions to pursue a higher degree. FIU already has a network of contacts with many National Labs and Universities to facilitate the placement of interested students in those Internship programs.

All the participating students working towards their Master’s will be required to write a Master’s thesis worth 6 credit hours in their last two semesters in the program under the supervision of a faculty member of their choice.

If the student drops one or more of his/her courses, thus becoming not a full-time student, he/she will automatically default on his/her scholarship at the end of the academic year, making one extra scholarship available for the next academic year. For the undergraduate students, in order to maintain the scholarship, the participating student must maintain an overall FIU-GPA of 3 or higher. As for the participating graduate students enrolled in the Master’s programs will have to keep an average of a B or better. In the event this GPA and average falls below 3 or a B average, the student will be given one extra semester to bring it back to those levels. If the student fails to do so, they will default on their scholar ship at the end of that semester.

Our goal is that at least 85% of the high school students in the program will graduate with a Bachelor’s degree after 4 years, and 90% of the transfer students will graduate with a Bachelor’s degree after 2 years and at least 20% of those transfer students will go on after graduation to join FIU graduate programs and get a Master’s degree in CS, MATH or ENG during the following 2 years.
In dealing with the problem of retention and attrition, in addition to the efforts of the faculty, we count on the expertise of Co-PI, Ms. Kandell Bentley-Baker, Director of Retention from the Division of Planning & Institutional Effectiveness at FIU, and Senior Assistant Mr. Charlie Andrews, Assistant Director of the Orientation and Commuter Student Services at FIU. The idea is that whenever one of our students is identified by their mentoring faculty as being at risk of defaulting on their scholarship or dropping out of the University, we need to develop a recipe, using the available supporting systems at FIU, to prevent this from happening. Ms. Bentley-Baker and Mr. Andrews will be the persons in the program in charge of coordinating those efforts for our students at risk. They will interview those students and will provide them with assistance and direction with the personal and academic problems they are facing.

We understand that there might be some students leaving the program for one reason or another. In this case a new scholarship will become available for a new student. We will keep a pool of candidates from both the High Schools and the Community Colleges at all times. The PI and Co-PI's will go back to that pool and try to identify the most qualified student. In the case this new student will not have graduated by the time the FIU/CSEMS funding ceases, we will have identified through the Financial Aid office at FIU and other related offices and scholarship programs, another source of financial help for that student so that he/she will continue with his/her studies until he/she graduates.

Also, some of the transfer students might decide to join the workforce after they graduate with their Bachelor’s degree in two years. In this case those scholarships that will become available for their last 2 years of the program will go to transfer students giving them the opportunity to finish on the last 2 years of the program their Bachelor’s degree. For these students we have in place ways to continue on for their Master’s degree, if they so desire, with FIU funding through Teaching Assistantships available in CS, MATH and ENG.

PROGRAM DESCRIPTION/BACKGROUND

Florida International University (FIU), a member institution of the State University System of Florida, was established by the State legislature on June 22, 1965 in response to the increasing demand for a public university by the student population in South Florida. The main campus is located at University Park in West Dade County, approximately 10 miles west of Downtown Miami. There are over 32,000 students enrolled at FIU in the Fall 2000, of whom the vast majority is from under-represented or economically and socially disadvantaged groups. FIU is considered a Hispanic Serving Institution (HSI) or a Minority Institution (MI). The majority of its students are eligible to receive some form of financial aid (see Summary of Financial Aid Awards chart below). Due to the high demand for financial assistance, FIU is not able to provide all its students with the funding needed to pursue and obtain a university degree. Financial assistance is provided on the basis of need and performance. However, this assistance is
provided equally among the students, without regard to their individual program of study. Therefore, critical national need disciplines, such as engineering, computer science and mathematics, do not receive a greater share of financial funding for their students over other programs. With the establishment of this NSF Scholarships programs, the University will be able to recruit and direct additional funding to a number of low income, academically excellent students with financial needs who are pursuing degrees that are of national significance and on which the minority representation is under the quotas.

It follows a list of the various degree programs at FIU, by level, that would be considered eligible degree programs under the NSF guidelines for this program:

**BACHELOR’S AND MASTER’S DEGREE PROGRAMS**

- Computer Science
- Civil Engineering
- Biomedical Engineering
- Computer Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering
- Mathematics
- Statistics

Over the last 5 years, the total enrollment at FIU for all these degree programs shows a slight growth, at the same time that national enrollment trends are declining. Additionally, FIU’s enrollment for minorities is increasing faster than overall enrollment growth. FIU is the second University, after the University of Puerto Rico in Mayaguez, in the number of graduates with a degree in engineering.

In the year 1999-2000, between Grants, Student Loans, Scholarships and Student Employment of different types, FIU awarded a total of $72,422,093 with a total number of awards of 33,034. This represented an increase of about a 6% over the dollar amount from the previous year and an increase of about 6% on the total number of awards from the previous year.

The following chart provides data on retention and graduation for the eligible degrees under the NSF/CSEMS program. There are two charts, the first for FTIC (First Time in College) students shows the six-year graduation and retention rates; and the second shows the same data for the AA transfer students from the Florida community colleges.

**First Time in College Student Six-Year Rates**

<table>
<thead>
<tr>
<th>Major</th>
<th>Graduation Rate</th>
<th>Retention Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science</td>
<td>60%</td>
<td>80%</td>
</tr>
<tr>
<td>Math</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>78.6%</td>
<td>78.6%</td>
</tr>
<tr>
<td>Major</td>
<td>Graduation Rate</td>
<td>Retention Rate</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Computer Science</td>
<td>24.4%</td>
<td>44.4%</td>
</tr>
<tr>
<td>Math</td>
<td>11.1%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>50%</td>
<td>75%</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>35%</td>
<td>67.5%</td>
</tr>
<tr>
<td>Construction Management</td>
<td>47.1%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Industrial and Systems</td>
<td>83.3%</td>
<td>100%</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>46.2%</td>
<td>46.2%</td>
</tr>
</tbody>
</table>

- Retention is defined as graduated or still enrolled at FIU, but not necessarily within the major.
- Four and six year graduation rates mean a student has graduated by the end of the fourth year or end of the sixth year from first enrollment at FIU.
- AA Degree Transfers are Associate in Arts Degree students from Florida Community Colleges.

The University’s student body’s demographic composition in terms of ethnicity is as follows: 53% Hispanic, 22% White, 14.5% Black, 3.5% Asian, 7% Other ethnic groups.

The following is a list of all the professional accreditations held by FIU and the respective FIU degree programs in alphabetical order.

- ACCOUNTING: International Association for Management Education (AACSB).
- ART MUSEUM: American Association of Museums.
- BUSINESS: International Association for Management Education (AACSB).
- CHEMISTRY: American Chemical Society (Certified).
- COMPUTER SCIENCE: Computer Science Accreditation Commission.
- CONSTRUCTION MANAGEMENT: American Council of Construction Education.
- EDUCATION: National Council for Accreditation of Teacher Education (NCATE).
- ENGINEERING: Accreditation Board for Engineering and Technology (ABET).
In the following, we are providing some data on student placement in employment and further higher education (within the SUS State University System of Florida) upon graduation, pertaining to the NSF/CSEMS eligible programs. These are outcomes from the Fall 1998 for FIU 1992-1993 graduates:

<table>
<thead>
<tr>
<th>Major</th>
<th>Employment Rate</th>
<th>Higher Ed. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer Science</td>
<td>69%</td>
<td>2%</td>
</tr>
<tr>
<td>Math</td>
<td>79%</td>
<td>8%</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>73%</td>
<td>6.5%</td>
</tr>
<tr>
<td>Computer Engineering</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Electrical Engineering</td>
<td>70%</td>
<td>7.5%</td>
</tr>
<tr>
<td>Construction Management</td>
<td>67%</td>
<td>7%</td>
</tr>
<tr>
<td>Industrial and Systems</td>
<td>80%</td>
<td>8%</td>
</tr>
<tr>
<td>Mechanical Engineering</td>
<td>76%</td>
<td>8%</td>
</tr>
</tbody>
</table>

All this information clearly supports the number and the size of the requested scholarships in this proposal.

**SELECTION CRITERIA**

As a NSF program requirement, we will initially check that all the applying students meet the requirements for citizenship, major, academic potential, and need that are outlined in Section III-C, Eligibility Information, Scholarship Recipients of the NSF/CSEMS Program Solicitation. These eligibility criteria will have to be demonstrated in each semester of CSEMS support.

In addition to that, all the students receiving one of the scholarships will have to
demonstrate a financial need, as defined by eligibility for Pell Grants or Graduate Assistance in Areas of National Need. They must have a combined GPA of at least 3.0. During their tenure of one of these scholarships they must be enrolled as full-time students during the Fall and Spring semesters (at least 12 credit hours per semester) as majors in one the eligible degrees listed in the table above.

Selection Process

During the Fall 2001 and the Spring and Summer 2002, the personnel involved at FIU (PI, Co-PI's and Senior Assistants) and the administration at both CPSHS and MDCC will coordinate efforts directed to make their graduating students, interested in pursuing academic careers in CS, MATH and ENG, aware of the FIU/CSEMS scholarship program and to select the recipients of some of the scholarships for the 2002-2003 through 2005-2006 academic years (see the letters of collaboration from CPSHS and MDCC in the Special Information and Supplementary Documentation section). At the same time, some qualifying interested students might contact us from some of the Miami Dade High Schools and Florida Community Colleges where we have sent information regarding our program. We will arrange for those students to undergo the same selection process with us.

With the assistance of the faculty and administration at both CPSHS and MDCC, we will interview the eligible and interested students. During those interviews, and prior to them through the input given to us by the faculty and administration at CPSHS and MDCC, we will try to assess not only the academic merit of the candidates but also their professionalism (e.g., motivation, ability to manage time and resources, communication skills, etc). The FIU interview panel will be composed of three of the faculty PI’s and Co-PI Ms. Bentley-Baker and Senior Assistants Ms. Damon and Mr. Andrews.

This will require a continuous coordination between the PI’s at FIU and CPSHS and MDCC’s administration. We will keep a folder for each of the students interviewed during this period.

An Interview Score will be assigned to each of those interviewed students.

At the end of the Fall 2001 and Spring 2002 semesters, four meetings will take place between the three institutions involved (1 Fall 2001 & 1 Spring 2002 between FIU & CPSHS and 1 Fall 2001 & 1 Spring 2002 between FIU & MDCC) to discuss the eligible students. Two final meetings will take place sometime during the Summer 2002 semester between the same institutions to choose the recipients of the scholarships. A final ranked list of students for both institutions will be produced during those two final meetings.

After the announcement of the awards, the awarded students will have one month (deadline July 1st, 2002) to consider the offer. If a student from one institution declines our offer, that scholarship will be offered to the next student in that institution’s list.

In order to facilitate the ranking we will use the following formula to come up with an individual score for each of the participating/qualified students.

GPA + Interview Score + Need = Final Score.

Where the Interview Score will assign an additional maximum of 3.0.

Need will be a positive number, which will be computed as follows: With the
assistance of Senior Assistant Ms. Maria Tolon, we will determine for each of the eligible students their “Financial Need” as being equal to the difference between:

\[
\text{FIU’s Cost of Attendance - EFC} = \text{Financial Need}.
\]

The EFC (Expected Family Contribution) of each eligible student will be computed by them filling out a Free Application for Federal Student Aid and forward them to Ms. Tolon who using FIU’s Cost of Attendance will come up with each student Financial Need. Once we have all the Financial Need positive number for all the eligible students, we will assign a maximum of 3.0 points to the student with the highest Financial Need and for the rest, we will compute a proportional number between 0 and 3.0.

The GPA score will be converted to a 0 to 4 scale for the High School students. Thus, the Final Score will be a number between 0 and 10.

After this selection process is finished and during the months of July and August of 2002, prior to the beginning of the Fall semester, individual orientation will be provided to the students entering the program. Specifically, an advisor will be assigned to each of those students. These advisors will be the faculty PI’s and faculty from the CS, MATH and ENG departments. They will have the responsibility of meeting with their advisees during those 2 months and designing a program for each one of them (i.e., classes to take in the Fall/Spring), assisting them with all the problems associated with entering a new institution, directing them to the proper support office at the University which will help them with a more smooth transition, assigning them a research advisor for the year, etc.

We will closely work with the offices of Orientation and Undergraduate Studies at FIU. Their staff members will provide us with their extensive advising expertise to help the students navigate through these transition waters. The Office of Undergraduate Studies at FIU will assign to each of our students an experienced Peer Advisor to assist him/her with the everyday problems of adjusting to his/her new environment. This will be especially critical during their first two semesters at FIU.

Co-PI Ms. Bentley-Baker will play a fundamental role with her expertise in retention. She will be directly involved in advising and providing the students with information which will help them cope with the daily problems associated with University life. One of our most important goal is to retain all the students through their graduation.

No percentages are being attached to the number of scholarships assigned to each discipline (CS, MATH and ENG). If in any given year there are more qualified students interested in computer science than in mathematics or engineering, an edge will be given to the first. In other words, no quotas will be established at this level.

**THE RESEARCH EXPERIENCE**

One of the more important goals in our program and also a measure of success, will be to maximize the percentage of students who will go to graduate school after graduation. In order to do that it is fundamental that we successfully integrate the
students into research projects. Even for those students not interested in going to graduate school after graduation, this research experience will serve them well in their professional careers making them understand better their own discipline and providing them with a deeper knowledge of their field of expertise.

The assigned faculty mentor will be in charge, after consulting with the student, of placing the student in one of the participating Institutes/Centers where the students will have a hands-on research experience collaborating on the research projects of the center or of contacting an individual FIU faculty member whose research might be of special interest to the student (see the Special Information and Supplementary Documentation section for a list and letters of collaboration of some of the FIU’s participating centers).

We want to keep this research experience at FIU, since we believe this will allow us to make our students’ University experience more complete.

This Research Experience will be mandatory during the Fall and Spring semesters of their senior year as undergraduates, although faculty mentors will encourage their students to join this experience as early as possible, even during their junior year at the University.

At the end of each of the semesters in which this research experience will take place, the student will have to present his/her work to his/her faculty mentor, who will assess the work done.

Also, the students will be permanently exposed to information regarding graduate school and will be given information on Assistantships and graduate programs at different universities. Our goal is that at least 20% of the participating high school students will apply to graduate school after they finish their undergraduate degree at FIU and 40% of the transfer community college students will go on to graduate school. We will help them to make a list of Universities to apply to according to their transcripts and preferences, contact those institutions for application materials and make sure that those applications are sent.

Another alternative for this Research Experience is through the FGAMP program at FIU. This research experience consists of students working during the summer with a university professor on a research topic related to their field of interest. The student should fill out a Research Experience Program application and submit an abstract written with the help of the professor, on the topic of their research. At the end of the summer, the student must write a final report between 8 and 12 pages long explaining the research conducted during this research experience. The students also have the option to present this final report in the form of a poster. For more information on this research experience and a letter of intent from the FGAMP coordinator at FIU, Engineering Professor Gustavo A. Roig, see the Special Information and Supplementary Documentation section. Every student in our CSEMS program will be required to at least undergo two semesters of Research Experience. The specific semesters in which the students will be enrolled in those experiences will be determined between the student and his/her faculty mentor.

THE SPRING REUNION

The Spring reunion will take place each of the four years the program lasts, at the end
of the spring semester. It will be closely connected to the Research Experience. The intention of this reunion is to have three sessions, one for each of the 3 disciplines, where the students will give a short presentation on their research experience during the year. This presentation can be in the form of a poster or an oral 15 minute presentation. All the participating students in the program will be invited to attend the reunion.

This reunion will have the side benefit of bringing together on the same location most of the students participating in the program. It will be a one-day experience, with the morning dedicated to the poster presentations and the afternoon to the oral presentations so that all the students will be able to participate in both.

There will be a communal noon lunch during which a personality in the field of CS, ENG or MATH will deliver a motivational address to the students. Both the poster and the oral presentation sessions will have a panel of judges made up of FIU faculty, who will award several prizes to the most meritorious posters and oral presentations.

This reunion will contribute to a more interpersonal exchange among the participating students, which will complement the academic component of the program.

The FGAMP program organizes an annual Expo in the Spring semester. The PI of this proposal has been attending this Expo for the last 3 years as a Judge for the Poster presentation, where students from all the participating institutions display posters in the Sciences, Mathematics, Computer Science and Engineering. We have the commitment from the FIU site coordinator of the FGAMP program, Dr. Gustavo Roig, to incorporate the students in our CSEMS program as participants of this Expo.

**PROGRAM PERSONNEL DESCRIPTION**

**- Mathematics Professor: Enrique Villamor, PI.**

- Professor and Chair of the Department of Mathematics at FIU.
- Chair of FIU-HSI (Hispanic Serving Institution) Task Force.
- Member of the advisory board for the FCETP (Florida Collaborative for Excellence in Teacher Preparation) NSF funded program.
- Co-PI of the ENLACE (Engaging Latino Communities for Education) $1,500,000 W.K. Kellogg Foundation grant 2001-2005.
- Member of FIU Retention Committee.
- FIU-FGAMP collaborator.

**- Mathematics Professor: Philippe Rukimbira, Co-PI.**

- Associate Professor of the Department of Mathematics at FIU.
- Judge of Science, Mathematics and Engineering competitions.

**- Computer Science Professor: Bill Kraynek, Co-PI.**

- Associate Professor and Associate Director, School of Computer Science at FIU.
- He has been Reader for the Advanced Placement Computer Science Exams in 1999 and 2000.
- He was a Co-PI in a US Dept. of Defense funded project on Undergraduate Curriculum and Course Development, 1994.
- **Engineering Professor: Armando B. Barreto, Co-PI.**
  - Associate Professor of the Electrical Engineering Department at FIU.
  - He has been PI and Co-PI in numerous federally funded projects (NSF, DOE, USAF).

- **FIU Division of Planning and Institutional Effectiveness: Ms. Kandell Bentley-Baker, Co-PI.**
  - Director of Retention, Division of Planning and Institutional Effectiveness at FIU.
  - Consultant in management and organizational development.
  - Associate Dean of Community and Business Relations, MDCC 1987-1990.
  - Director of Planning and Development at MDCC 1984-1987.

- **Career Services FIU: Ms. Dulce Damon, Senior Assistant.**
  - Assistant Director-Experiential Education at FIU Career Services.
  - Graduate of the Leadership Miami Program.
  - Received several grants for Career Development Programs and Career Technology labs.

- **FIU Financial Aid Office: Ms. Maria Tolon, Senior Assistant.**
  - Associate Director of the Financial Aid Office at FIU.
  - 23 years of experience in financial aid.
  - Member of the Florida Association of Student Financial Aid administrators.
  - Member of the Southern Association of Student Financial Aid administrators.

- **FIU-Orientation Office: Mr. Charles Andrews, Senior Assistant.**
  - Assistant Director of FIU’s Orientation & Commuter Student Services Office.
  - Nine years experience with student orientation, advising and counseling.

**PROGRAM MANAGEMENT AND ADMINISTRATION**

The FIU NSF/CSEMS program will be administered by the PI and all the Co-PI’s and Senior Assistants of the project. The PI and 7 Co-PI’s and Senior Assistants of the program will hold meetings throughout the semesters (one meeting per month) to discuss the progress of the participating students and the administrative and managerial issues related to the program. The main burden of the administration and management of the program will fall on the PI, Enrique Villamor. The Co-PI’s and Senior Assistant
personnel will assist him with management, administration and coordination issues. The PI will be in charge of monitoring the personal files of each of the participating students. These files are kept by the faculty mentors, with information on their progress, academic performance and all the other information related to their University experience. Those files will include information personally recorded by the faculty mentor or reported to him by either the student or personnel within the supporting systems of the University, who have had a contact with the student.

The program will use 8% of its budget for the management and administration of the program to hire a part-time university student-assistant to help the Principal Investigator with the paperwork and clerical chores involved in administering the program. Mainly, this student assistant, will be in charge of records for the FIU/CSEMS program and coordinating the monthly meetings of the PI, Co-PI’s and Senior Assistants of the program, contacting all the faculty mentors for possible issues they would like to be discussed on those meeting pertaining to their mentored students. All the faculty mentors will be duly informed about these monthly meetings and they will have the opportunity to attend them if they deem it is appropriate.

The PI with the help of the student assistant, will be in charge of coordinating and articulating all the contacts between FIU, CPSHS, MDCC and other participating High Schools and Florida Community Colleges in the program.

Two per cent of the funds allocated to scholarships for student-support infrastructure will also be used to offset the university student assistant’s wages. The PI and the student assistant will be in charge of acquiring from CPSHS and MDCC officials the lists of initially eligible students and preparing the folders for each of them, as well as for the students who send an application having known about our program from the information that will be mailed to the Miami Dade High Schools and Florida Community Colleges.

The PI and the student assistant will be in charge of forwarding to the faculty mentors pertinent information to be incorporated into the students’ files, such as updated GPA’s, transcripts, results of the summer research experiences, letters from participating faculty, interview reports, etc.

The PI and the student assistant will also coordinate all the monthly meetings between the PI, Co-PI’s, Senior Assistants and faculty mentors. The faculty mentors will be in charge of assisting the interested participating students with their graduate school applications.

**EVALUATION AND DISSEMINATION PLANS**

Our evaluation plan will have both quantitative and qualitative components comparing surveys results and final grades of the students in our program (experimental group) with the ones for the previously identified control groups. The quantitative component will
statistically compare the final reported course grades of students from both groups. The qualitative component will compare student answers to an efficacy based survey developed by the research team (PI and Co-PI’s) with input from the Computer Science, Engineering and Mathematics department faculties.

Student achievements will be compared using the course grades. Instructors teaching the same course for both the experimental and control groups will use similar questions in the final exams for those courses. In those exams there will be two types of questions. The first section of the test will contain questions which the faculty members feel reflect the core concepts that all students should know after successfully completing the course. The second section of the test will contain questions that the faculty members agree reflect a higher order set of skills. The more difficult section of the test will be weighted so that it will not adversely affect the student’s final grade.

Student efficacy will be measured using the qualitative instrument developed by the research team. The purpose of this survey will be to ask the students in both the experimental and control groups about their overall experience during the semester. The experimental design of this study is a post-test only control group design. Student data will be collected using an identification code which will identify individual student data. To protect student privacy, all questionnaires and achievement scores will be strictly controlled in a locked cabinet. The final report will not contain any information that can be directly associated with a particular student.

There are a variety of independent variables that may influence the student’s achievement scores and their perception of efficacy. The efficacy questionnaire will ask for information in an effort to determine the influence of certain independent variables on the students. The independent variables inquired about in this questionnaire are the following: student name, student ID number, student discipline of study, year in school, class attendance, student’s perception of the Instructor, gender, age, previous experiences with the taught materials, and number of credit hours currently enrolled in.

There will be two dependent variables under investigation in this study. The first will be the effects of the program (our program versus traditional) on the student achievement. The second will be the effects of the program on the students’ perception of academic efficacy.

The person developing this evaluation will not interact with any of the students in a teaching capacity. The students in those groups will be asked to voluntarily participate in the survey and will have the option of refusing to participate with no repercussions.

There will be two control groups. All the three groups will be taking the same set of courses, and the set of Instructors teaching the experimental group will be the same set of Instructors for one of the control groups. The research evaluator will not in any way attempt to influence the students’ decision to participate in this study. Both the experimental and control groups taught by the same set of Instructors will have the same classroom experience, however, the students in the experimental group will have access to all the supplementary support provided by our program. The third control group will be taught by a set of Instructors with comparable experience.

Because of the FIU’s registration process, the research evaluator has no control over
which students elect to register for the control group. Students in the control groups will be chosen to be of a skill level comparable to the ones in the experimental group (GPA, SAT scores), with similar prior experience, and same majors and level of interest. The students in each group will be asked to complete the same project assignments and standard course requirements. The Instructors of all the groups will provide the research evaluator with the final grades which will be used as a performance assessment.

Neither the efficacy survey results nor the students’ grades will be identified in any way that could be tracked back to a particular student in the final study report. The results will be used only in groups. The individual grades and survey results will be identified by student name and ID number as well as the group to which they belonged. The identity of the students will be kept in the strictest confidence and will not be shared with those outside the research study.

The data will be identified by group and compared by group. The first statistical test to be performed on the data will be a t-test to compare the two control groups for each course Instructor. The t-test will be used to determine how closely the results of the students in both control groups compare. A test will be performed to compare the control group taught by the same set of Instructors as the experimental group to see how closely their final results compare. The research evaluator will also perform a series of chi-squares using student discipline of study, year in school, attendance to class, student’s perception of Instructor, gender, age, previous experiences and the number of credit hours for which the student is enrolled comparing the experimental and control groups for each course Instructor to determine if the final analysis might need to use one or more of these items as covariates.

Achievement scores will be compared using two way ANOVA between the experimental and control groups for each Instructor for the final grades of the course. If covariates are found in the previous tests, the research evaluator will use ANCOVA rather than ANOVA. Efficacy survey results will be compared using a phenomenological approach.

Although CPSHS and MDCC are the two main institutions from which we will be drawing participating students for our program, we will be sending flyers and contacting via e-mail and phone all the Miami Dade High Schools and Florida Community Colleges to inform them of our scholarship program. We will regularly keep them updated on the progress and activities of the program (Spring reunions, Internships and Research Experiences opportunities, etc).

The FIU Department of Mathematics webmaster will be in charge of creating a webpage for the FIU/CSEMS program. In this webpage all the information related to our program will be stored.

The webpage will also have links to academic supporting systems for our students.

- There will be a link to the website Co-PI, Ms. Bentley-Baker is currently developing (GATO) in which the students can find a wide array of supporting systems (see Special Information and Supplementary Documentation section of the proposal for information on the contents of GATO’s website (aka VLSS Virtual Learning Support System)).
• There will be links to the graduate programs in CS, MATH and ENG to many of the principal universities in the nation where the interested students will be able to obtain information if they are interested in pursuing a higher degree in their field of interest.
• There will be links to many other CSMES programs throughout the nation, so that our students can get information on those similar programs, and possibly exchange information and ideas which will enrich our own program.

All this information will be made available to all the participating students.

The weekly meetings between the students and their faculty mentors will be the first source of the evaluation process. In those meetings the faculty mentor will screen the student to determine if the overall learning experience is going well. If a problem is encountered, the faculty mentor will try to find a solution by either taking personal action or referring the student to the appropriate University department where the student will receive counsel. All the findings of those meetings will be reported in the student’s file by making a weekly entry.

The monthly meetings held between the PI, Co-PI’s, Senior Assistants and faculty mentors will be the second step in the evaluation process, where we will be making a continuous assessment of our program and determine if some fine tuning of its components is necessary or if, according to our findings, some additional component or components should be implemented. For instance, we might find through our contacts with other similar ongoing programs, that they are doing something effective that we should be adding to our own. We might find in those meetings that there are problems affecting to a large group of the students, in these meetings we will discuss those problems and provide a plan for their solution. Also, in those meetings the individual overall progress of each of the participating students will be discussed and evaluated in a broader sense.

Steps will also be taken to reach and contact other on going CSEMS programs throughout the nation to exchange information and get advise from more experienced programs which will help our own to improve its effectiveness.