May 6, 2010

MEMORANDUM

TO: Darryll Pines  
    Dean, A. James Clark School of Engineering

FROM: Elizabeth Beise  
    Interim Associate Provost for Academic Planning and Programs

SUBJECT: Proposal to Offer the B.S. in Mechanical Engineering at the Southern Maryland Higher Education Center (PCC log no. 09040)

On February 1, 2010, the Maryland Higher Education Commission approved your request to offer the existing Bachelor of Science in Mechanical Engineering program at the Southern Maryland Higher Education Center. A copy of the approved proposal is attached.

The changes are effective immediately. The School should ensure that the changes are fully described in the Undergraduate Catalog and in all relevant descriptive materials, and that all advisors are informed.

MDC/
Enclosure

cc: Alex Chen, Chair, Senate PCC Committee  
    Sarah Bauder, Office of Student Financial Aid  
    Reka Montfort, University Senate  
    Erin Howard, Data Administration  
    Donna Williams, Institutional Research & Planning  
    Anne Turkos, Archives  
    Linda Yokoi, Office of the Registrar  
    James Dietz, Undergraduate Studies  
    Gary Pertmer, A. James Clark School of Engineering  
    Avram Bar-Cohen, Mechanical Engineering
Dear Dr. Mote:

The Maryland Higher Education Commission has received and reviewed a request from University of Maryland, College Park to offer the existing Bachelor of Science (B.S.) in Mechanical program at the Southern Maryland Higher Education Center. I am pleased to inform you that the request has been approved based on the recommendation of Assistant Secretary for Planning and Academic Affairs, Dr. George W. Reid. This decision was based on an analysis of the proposal in conjunction with the Maryland Higher Education Commission’s Policies and Procedures for Academic Program Proposals, Maryland State Plan for Postsecondary Education, and a thirty-day review by the Maryland higher education community. The program demonstrates potential for success, an essential factor in making this decision.

For purposes of providing enrollment and degree data to the Commission, please use the following HEGIS and CIP codes:

<table>
<thead>
<tr>
<th>Program Title</th>
<th>Degree Level</th>
<th>HEGIS</th>
<th>CIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mechanical Engineering</td>
<td>B.S.</td>
<td>0910-00</td>
<td>14.1901</td>
</tr>
</tbody>
</table>

Should the program require any substantial changes in the future, please keep the Commission apprised. I wish you continued success.

Sincerely,

James E. Lyons, Sr.
Secretary of Higher Education

cc: Dr. Nariman Farvardin, Senior Vice President for Academic Affairs and Provost, UMCP Ms. Theresa Hollander, Associate Vice Chancellor for Academic Affairs, USM Dr. Mel D. Powell, Executive Director, Southern Maryland Higher Education Center Dr. George W. Reid, Assistant Secretary for Planning and Academic Affairs, MHEC
December 1, 2009

James E. Lyons, Sr.
Secretary of Higher Education
Maryland Higher Education Commission
839 Bestgate Road, Suite 400
Annapolis, MD 21401

Dear Dr. Lyons:

Attached please find a proposal to offer a degree completion program for the Bachelor of Science in Mechanical Engineering at the Southern Maryland Higher Education Center (SMHEC). The proposal was developed in response to a demand for upper level undergraduate courses in the existing College Park Mechanical Engineering curriculum by residents in the Southern Maryland region, where no such degree program is presently available. It is the result of a partnership between the A. James Clark School of Engineering, the College of Southern Maryland, the Naval Air Warfare Center Aircraft Division (NAWCAD), and the SMHEC.

The proposal has been endorsed by the appropriate faculty and administrative committees within the Clark School of Engineering. I endorse this proposal and am pleased to submit it to the Maryland Higher Education Commission for your approval.

Yours sincerely,

EJB/

Attachment

cc: William E. Kirwan, Chancellor
Theresa Hollander, Associate Vice Chancellor for Academic Affairs
Nariman Farvardin, Senior Vice President for Academic Affairs and Provost
Darryll Pines, Dean, A. James Clark School of Engineering
A PROPOSAL

TO OFFER A DEGREE COMPLETION PROGRAM FOR THE

BACHELOR OF SCIENCE IN MECHANICAL
ENGINEERING

at the

SOUTHERN MARYLAND HIGHER EDUCATION CENTER

Submitted By

THE A. JAMES CLARK
SCHOOL OF ENGINEERING

UNIVERSITY OF MARYLAND, COLLEGE PARK

Prepared by:

DR. DARRYLL PINES, DEAN
A. JAMES CLARK SCHOOL OF ENGINEERING
UNIVERSITY OF MARYLAND AT COLLEGE PARK
College park, MD 20742

PROPOSED INITIATION DATE: FALL 2009
A PROPOSAL
TO OFFER A DEGREE COMPLETION PROGRAM FOR THE
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING
at the
SOUTHERN MARYLAND HIGHER EDUCATION CENTER

I. Rationale and Need for the Proposed Program at the Southern Maryland Higher Education Center

A. How was the need/market demand established for the offering of this program in Southern Maryland?

The Department of Mechanical Engineering has been aware of the need for the B.S. Degree in Mechanical Engineering program through its research connections with the Naval Air Warfare Center Aircraft Division (NAWCAD) at the Patuxent River Naval Air Station, and is responding to NAWCAD’s difficulty in finding qualified engineers to conduct aviation and test operations on the Base. The A. James Clark School of Engineering has a nationally recognized Bachelor of Science in Mechanical Engineering that is currently being offered at the main campus in College Park, Maryland. The A. James Clark School of Engineering currently offers a Professional Master of Engineering Degree with nine options at the Southern Maryland Higher Education Center, as well as a Graduate Certificate in Engineering with eight options. University of Maryland Mechanical Engineering upper division undergraduate courses would be added. The B.S. in Mechanical Engineering program articulates with the College of Southern Maryland’s (CSM) lower division engineering courses.

The Commander of NAWCAD has stated that 400 engineering jobs are open at the Patuxent River Naval Air Station each year. In a recent (spring 2008) survey of 202 technical defense contractors in southern Maryland conducted by the Southern Maryland Higher Education Center (SMHEC), Mechanical engineering was second to the top as a workforce priority among the 56 engineering job positions listed as available by the contractors responding at that time.

Bachelor’s Completion Degree Programs in engineering have become a high priority in southern Maryland. A bachelor’s in mechanical engineering is not available in the region at present. To the end of facilitating the presentation of a B.S. in Mechanical Engineering in southern Maryland, a partnership between the A. James Clark Engineering School, NAWCAD, CSM and SMHEC has been formed to increase the number of people in southern Maryland prepared to provide advanced Mechanical engineering skills to the Patuxent River Naval Air Station and
defense companies that work with it. Efforts are underway to publicize the educational opportunity to area high school students as well, in what is termed a "STEM project" (promoting science, technology, engineering and mathematics as career options for young people).

With regard to the partnership in southern Maryland, University of Maryland President C. D. Mote, Jr. said "Increasing the number of highly qualified engineering graduates is important for national security, and our economic and international competitiveness. The University is excited to be collaborating with our partners in Southern Maryland and at the Patuxent River Naval Air Station towards this end. This is the right partnership at the right time."

The new Southern Maryland partnership program will entail a multi-year initiative encompassing education and research activities, starting in the fall of 2009.

"NAWCAD has world-class engineering facilities. In partnership with these educational institutions, who offer world-class learning experiences, we'll lay the foundation for the future of Naval Aviation," said Rear Adm. Donald Gaddis, NAWCAD Commander.

An engineering laboratory is currently being established at SMHEC to support lecture classes offered for the proposed B.S. in Mechanical Engineering degree program, designed and equipped in accordance with guidelines provided by the Mechanical Engineering Department at UMCP. Additional laboratories at the Patuxent River Naval Air Station will augment the engineering laboratory at SMHEC.

NAWCAD has announced the availability of tuition assistance in the amount of $4,500 per semester for full-time students accepted into the B.S. completion program at SMHEC by the Mechanical Engineering Department, as well as the availability of a cooperative education program that will provide on-the job learning and additional income to students accepted into the B.S. completion program.

B. **Describe the number of courses within the proposed program that will be offered in each semester, intersession, and or summer session within an academic year. Indicate the anticipated number of academic years or semesters that will be required to complete the degree program. Indicate a sequence of courses over a three year period.**

The number of courses offered during each semester will be determined by the number of students and the demand for particular courses by the students at the PAX Naval Air Station. University of Maryland is able to offer as many courses as necessary, which will likely be five, during the regular 16-week fall and spring semesters, as well as summer sessions of 8...
to 11 weeks, depending on the content of the offered course. A sample sequence of courses would be as follows:

**Fall (Junior Year)**
ENME 331 Fluid Mechanics  
ENME 350 Electronics & Instrumentation I  
ENME 382 Engineering Materials & Manufacturing Processes  
ENME 392 Statistical Methods for Product & Process Development  
CORE

**Spring (Junior Year)**
ENME 332 Transfer Processes  
ENME 351 Electronics & Instrumentation II  
ENME 361 Vibrations, Controls, & Optimization I  
ENME 371 Product Engineering & Manufacturing  
CORE

**Fall (Senior Year)**
ENME 462 Vibrations, Controls, & Optimization II  
ENME 472 Integrated Product & Process Development II  
ENME Technical Elective  
ENME Technical Elective  
ENME Technical Elective

**Spring (Senior Year)**
ENME Technical Elective  
ENME Technical Elective  
ENME Technical Elective

The University of Maryland currently has an articulation agreement in place with the College of Southern Maryland to provide a smooth transition of students into the B.S. in Mechanical Engineering Completion Degree Program at SMHEC.

**C.** Indicate if a similar program is offered in Southern Maryland. If a similar program does exist, describe the similarities or differences in the degree to be offered, the area(s) of specialization, and the academic content of the program and course of study.

No similar program exists in southern MD.

**D.** Is the subject program to be a permanent arrangement to the extent that students entering the program will be able to complete all degree requirements at the Center? Describe any circumstances that will require any off-Center registration.
The B.S. Degree completion portion of the program (300 and 400 level courses) will be offered at the SMHEC on a permanent basis. One or two courses may be offered at the College Park campus. SMHEC is in the process of preparing an engineering laboratory which will provide needed laboratory experiences for all courses taught at SMHEC.

E. **What is the proposed implementation date for this program?**

   Initial courses will be offered in the fall 2009 semester.

F. **Indicate the department(s) or other organizational unit(s) that will be responsible for this program.**

   The program will be offered and implemented by the Department of Mechanical Engineering, of the A. James Clark School of Engineering, University of Maryland.

**Course of Study Leading to the Proposed Degree**

A. **Briefly describe the educational objectives of the proposed program. Attach appropriate pages in the University catalog, which describe the subject program.**

   The B.S. in Mechanical Engineering program is structured to teach students to prepare for careers in the aviation industry and other industries. The main objective of the program is to produce practical design engineers as opposed to theoretical research scientists. All students complete a capstone sequence of courses.

B. **Indicate how the program will be described in promotional materials distributed in Southern Maryland.**

   For the promotional material, as a starting point, information is available at the link www.enme.umd.edu/

   The mechanical engineering major prepares students for the challenges of today and the future. The curriculum is one of the most up-to-date, forward-looking programs in the country. Students become involved with real-world engineering projects early on through extensive interaction with engineers from industry. This interaction continues throughout the curriculum. Coursework is fully integrated to provide a seamless undergraduate experience. Graduates possess the skills and knowledge base necessary for success in today's marketplace, and the education necessary to adapt and succeed as technology continues to change.

   The mechanical engineer of today faces a more extensive range of critical problems than ever before. Graduates must be skilled not only in the traditional fundamentals of mechanical engineering such as solid
mechanics, fluid mechanics, thermodynamics, heat transfer, materials engineering, electronic instrumentation and measurements, controls and design, but also in new/emerging areas such as mechatronics, smart structures, electronic packaging, communication, information systems, total quality management, reliability and electromechanical systems. Most topics require extensive use of modern computing hardware and software. Students are taught to make use of this capability and to make sound engineering judgments while analyzing seemingly unmanageable amounts of information. Attributes such as teamwork, ethics, social awareness, and leadership are emphasized in many courses.

Other promotional pieces will be made available to the center as needed.

C. Will advertised courses be offered as scheduled regardless of enrollment? If not, what are the criteria for determining whether a scheduled course will be offered?

The advertised courses will only be offered if registrations reach the minimum necessary to run the course.

D. Will there be a regular pattern of courses offered in the program? If yes, describe the planned schedule. If not, indicate how courses to be offered each term will be selected.

Courses will be offered based on student needs. When we deal with a small group of students, the department creates a multi-year schedule based on the group’s requirements for graduation. This schedule is relayed to the entire group and all students in the group are expected to follow the schedule. Students who fall out of sync with the schedule may have to catch up by independent study or by attending the main campus located in College Park, Maryland. If there is a continuous stream of students, then courses are offered on a regular basis and students who fall out of sync need only wait for the next term.

Enrollment figures and achievement of prerequisites by students will dictate offerings for Spring, 2010.

E. Will all courses be transferable into the corresponding on-campus program?

All courses offered by University of Maryland and successfully completed at the SMHEC will be transferable to the corresponding on-campus degree programs of University of Maryland to be used as required or elective courses of study as required by the degree program to which they transfer.

Students to be Served by the Proposed Program
A. Is their evidence of student interest in the proposed program? Indicate the source of students who will enroll.

There is significant evidence of student interest in the Mechanical Engineering Baccalaureate Program based on the research done by SMHEC, CSM and NAWCAD. In a recent survey conducted by SMHEC, 18 of the 28 largest defense contractors in the region mentioned a need for new employees with a B.S. in Mechanical Engineering as a priority. Some of the anticipated sources of students for our program are freshman and sophomore level students at CSM, who have attended meetings with representatives of the Department of Mechanical Engineering at the University of Maryland, NAWCAD, and SMHEC. These Students have exhibited high interest in completing their B.S. degree in southern Maryland, with involvement in a cooperative education program with NAWCAD, tuition assistance, and the guarantee of employment with NAWCAD upon successful completion of their course work at SMHEC. Also, employees of the Patuxent River Naval Air Base and employees of the many contractors of the defense industry located in the Southern Maryland area have indicated interest in enrollment in the proposed program.

B. What will be the criteria for admitting students to the proposed program? How do these compare with those for the corresponding on-campus program?

The criteria for admission of the students into the proposed program will be identical to those required of the students for the on-campus programs.

Accreditation

A. Is the program accredited by an appropriate discipline accrediting association?

University of Maryland is authorized by the state of Maryland (Maryland Higher Education Commission, 839 Bestgate Road, Suite 400, Annapolis MD 21401, 410-260-4500) to confer the Bachelor of Science Degree in Mechanical Engineering. The University of Maryland is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools (Commission on Higher Education, Middle States Association of Colleges and Schools, 3624 Market St., Philadelphia PA, 19104, 215-662-5606). The University of Maryland is approved for veterans’ education by Maryland Higher Education Commission.

Staffing

A. Will faculty for the subject program be permanent institutional faculty or adjunct faculty? Please provide a list of currently employed institutional faculty who will teach in the subject off-campus program.
A mix of both full time and adjunct faculty will teach the courses offered at the SMHEC. A list of all faculty in the Mechanical Engineering Department is attached. All full time faculty have doctoral degrees.

B. What will be the qualifications of adjunct faculty?

All faculty, including the adjunct faculty at University of Maryland are required to have a Masters or Doctorate degree in the discipline they teach, or in a closely related field, along with a minimum of three years of experience.

C. How will faculty be evaluated? How will the university evaluate the proposed degree program?

An evaluation form is filled out at the end of every semester both for permanent and adjunct faculty. In addition, the corresponding departmental advisor will evaluate the credentials of adjunct faculty before he/she is hired.

Library Requirements

A. Describe arrangement that will be made to provide library services to students enrolled in the subject program.

University of Maryland students at the SMHEC are entitled to the use of the University of Maryland library and the Metropolitan Washington University Consortium libraries with the same privileges that our traditional students enjoy. Additionally online services are available to all students, including students of the SMHEC.

Facilities and Equipment

A. Describe the facilities and equipment that will be required for the proposed off-campus program.

The Southern Maryland Higher Education Center classrooms are equipped with state of the art equipment of the type needed for the program. This includes classrooms equipped with PCs, and chalk or dry-erase boards, along with an LCD projector. An Engineering Laboratory has been prepared at SMHEC in accordance with guidelines prepared by the Mechanical Engineering Department.

Student Services

A. Describe the nature of counseling and other student services that will be made available at SMHEC.
The Chair of the Mechanical Engineering Department will maintain contact with all stakeholders. Additionally counseling will be provided by a counselor located at the SMHEC campus. Additional counseling will be available by appointment at the main campus.

## ENME Undergraduate Curriculum

### University CORE Program
Humanities & Social Sciences

### Basic Science Requirements

<table>
<thead>
<tr>
<th>Subject</th>
<th>Course</th>
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<tbody>
<tr>
<td>CHEM 135</td>
<td>General Chemistry</td>
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<tr>
<td>PHYS 161</td>
<td>General Physics I</td>
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<td>PHYS 260</td>
<td>General Physics II</td>
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<td>PHYS 270</td>
<td>General Physics III</td>
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<td>MATH 140</td>
<td>Calculus I</td>
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<td>MATH 141</td>
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<td>MATH 241</td>
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<td>MATH 246</td>
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### Engineering Science Requirements

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<td>ENES 100</td>
<td>Introduction to Engineering Design</td>
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<tr>
<td>ENES 102</td>
<td>Statics</td>
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<tr>
<td>ENES 220</td>
<td>Mechanics of Materials</td>
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<td>ENES 221</td>
<td>Dynamics</td>
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### Major Requirements

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<td>ENME 232</td>
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<tr>
<td>ENME 271</td>
<td>Introduction to MATLAB</td>
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<td>ENME 331</td>
<td>Fluid Mechanics</td>
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<td>Transfer Processes</td>
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<td>ENME 350</td>
<td>Electronics &amp; Instrumentation I</td>
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<td>ENME 351</td>
<td>Electronics &amp; Instrumentation II</td>
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<td>ENME 361</td>
<td>Vibrations, Controls, &amp; Optimization I</td>
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</tr>
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<td>ENME 371</td>
<td>Product Engineering &amp; Manufacturing</td>
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<tr>
<td>ENME 382</td>
<td>Engineering Materials &amp; Manufacturing Processes</td>
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<td>ENME 392</td>
<td>Statistical Methods for Product &amp; Process Development</td>
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<td>ENME 462</td>
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</tbody>
</table>

123 Credits

27 Credits

30 Credits

12 Credits

54 Credits
Dept. of Mechanical Engineering – Course Map
Course Descriptions

ENME 232: Thermodynamics
Prerequisites: ENES 102, PHYS 260, MATH 141. Introduction to thermodynamics. Thermodynamic properties of matter. First and second laws of thermodynamics, cycles, reactions, and mixtures. 3 credits.

ENME 271 Introduction to MATLAB
Learn the use of software MATLAB.

ENME 331: Fluid Mechanics I

ENME 332: Transfer Processes

ENME 350: Electronics and Instrumentation I
Prerequisite: PHYS 270. Modern instrumentation. Basic circuit design, standard microelectronic circuits. Digital data acquisition and control. Signal conditioning. Instrumentation interfacing. Designing and testing analog circuits. Laboratory experiments. 3 credits.

ENME 351: Electronics and Instrumentation II

ENME 361: Vibration, Controls, and Optimization I
Prerequisites: ENES 220, ENES 221, ENME 271 and MATH 246. Fundamentals of vibration, controls, and optimization. Analysis and design in time, Laplace, and frequency domains. Mathematical description of system response, system stability, control, and optimization. Optimal design of mechanical systems. 3 credits.

ENME 371: Product Engineering and Manufacturing

ENME 382: Engineering Materials and Manufacturing Processes
Prerequisite: ENES 220. Basic material structures and properties. Mechanical behavior of materials. Manufacturing process theory. Material processing. Quality assurance. Laboratory experiments. 3 credits.

ENME 392: Statistical Methods for Product and Process Development
Prerequisites: MATH 241. Integrated statistical methodology for improvement of products and processes in terms of performance, quality, and cost. Designed experimentation. Statistical process control. Software application. Laboratory activities. 3 credits.
ENME 462: Vibration, Controls, and Optimization II
Prerequisites: ENME 351 and ENME 361. Continuation of ENME 361. Fundamentals of vibration, controls, and optimization. Analysis and design in time, Laplace, and frequency domains. Mathematical description of system response, system stability, control, and optimization. Optimal design of mechanical systems. 3 credits.

ENME 472: Integrated Product and Process Development

ENME Faculty

Research Faculty | ME Lecturers | Fellows | Research Interests | Administrative Staff

Alphabetical Listing A - K
A  Anand, Davinder K.
    Azarm, Shapour
B  Balachandran, Balakumar
    Balaras, Elias
    Bar-Cohen, Avram
    Barker, Donald
    Baz, Amr
    Bergbreiter, Sarah
    Berger, Bruce
    Bergles, Arthur
    Bernard, Peter
    Bernstein, Joseph
    Bigio, David
    Bruck, Hugh
C  Chopra, Nikhil
    Christou, Aris
    Cukier, Michel
    Cunniff, Patrick
D  Dasgupta, Abhijit
    Desai, Jaydev
    DeVoe, Donald

Alphabetical Listing L - Z
L  Li, Teng
M  Magrab, Edward
    McCluskey, F. Patrick
    Modarres, Mohammad
    Mosleh, Ali
    Mote Jr., Clayton Daniel
    Mulholland, George W.
O  Ohadi, Michael
P  Pecht, Michael
R  Radermacher, Reinhard
    Riley, Donald
    Roush, Marvin
S  Sandborn, Peter
    Sanford, R.J.
    Schmidt, Linda
    Sengers, Jan
    Shih, Tien-Mo
    Smela, Elisabeth
    Solares, Santiago
Dieter, George  
di Marzo, Marino  
Duncan, James

E  Elliott, William III

F  Fourney, William

G  Gupta, Ashwani  
   Gupta, Satyandra

H  Han, Bongtae  
    Han, David  
    Herrmann, Jeffrey  
    Holloway, David

J  Jackson, Gregory

K  Kiger, Kenneth  
   Kim, Jungho  
   Kirk, James

Professor of Practice  
Millard S. Firebaugh  
Robert Fischell  
Jeong Kim

Affiliate Professors  
Dana Nau  
Jan Sengers  
James Quintiere  
Donald Riley

Affiliate Associate Professor  
Arnaud Trouve

Sreenivasan, Katepalli

T  Wallace, James

Y  Yang, Bao  
   Youn, Byeng Dong  
   Yu, Miao

Z  Zachariah, Michael R.  
   Zhang, Guangming

Professor Emeritus  
Ronald W. Armstrong  
Davinder K. Anand  
Bruce S. Berger  
Patrick F. Cunniff  
James Dally  
George E. Dieter  
David Holloway  
John Jackson  
James Kirk  
Edward Magrab

http://www.glue.umd.edu/~jkirk/
Affiliate Assistant Professor
Andre Marshall

Research Professors
Arthur Bergles

Visiting Professors
David K. Han
George W. Mulholland
Azar Nazeri
James Short
Ephraim Suhir

Colin Marks
Marvin Roush
R.J. Sanford
Clifford Sayre
Charles Shreeve
Mustafa E. Talaat
William H. Walston
Jackson Yang