
 FLORIDA ATLANTIC UNIVERSITY	NEW COURSE PROPOSAL Graduate Programs		UGPC Approval _____ UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____
	Department Ocean & Mechanical Engineering College COECS <i>(To obtain a course number, contact erudolph@fau.edu)</i>		
Prefix BME Number 6585	<i>(L = Lab Course; C = Combined Lecture/Lab; add if appropriate)</i> Lab Code	Type of Course Lecture	Course Title Advanced Topics in Microfluidics and BioMEMS
Credits <i>(Review Provost Memorandum)</i> 3	Grading <i>(Select One Option)</i> Regular <input checked="" type="radio"/> Sat/UnSat <input type="radio"/>	Course Description <i>(Syllabus must be attached; see Guidelines)</i> A comprehensive introduction to microfluidics, micro-electro-mechanical systems (MEMS) and microfabrication techniques. Advanced topics on the applications of microfluidics and MEMS for bioengineering problems (bioMEMS). Topics include fluid properties, flow behavior, Electrokinetics, photolithography, soft lithography, flow control, manipulation and characterization of biological cells using engineered microdevices.	
Effective Date <i>(TERM & YEAR)</i> Fall 2020	Prerequisites EML 3701 and MAP 3305, or permission of instructor	Corequisites	Registration Controls <i>(Major, College, Level)</i> Graduate students and seniors in the College of Engineering and Computer Science
Prerequisites, Corequisites and Registration Controls are enforced for all sections of course			
Minimum qualifications needed to teach course: Member of the FAU graduate faculty and has a terminal degree in the subject area (or a closely related field.)		List textbook information in syllabus or here No required textbook. Suggested Reference: Albert Folch, 'Introduction to BioMEMS', CRC Press, 2012. ISBN-13: 978-1-439818398	
Faculty Contact/Email/Phone Dr. Sarah Du edu@fau.edu / (561) 297-3441		List/Attach comments from departments affected by new course None	

Approved by Department Chair <u></u> College Curriculum Chair <u>Ramesh Teegavarapu</u> College Dean <u>Mihaela Cardel</u> UGPC Chair _____ UGC Chair _____ Graduate College Dean _____ UFS President _____ Provost _____	Date <u>11/18/2019</u> <u>11/22/2019</u> <u>11/22/2019</u> _____ _____ _____ _____
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Email this form and syllabus to UGPC@fau.edu one week before the UGPC meeting.

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Florida Atlantic University
Course Syllabus**

1. Course title/number, number of credit hours	
BME 6585 Advanced Topics in Microfluidics and BioMEMS	3 credit hours
2. Course prerequisites, corequisites, and where the course fits in the program of study	
Prerequisites: EML 3701 Fluid Mechanics and MAP 3305 Engineering Mathematics, or permission of instructor	
3. Course logistics	
<i>Term:</i> Fall/2020 <i>Class location and time:</i> All course assignments are required to be submitted online using Canvas.	
4. Instructor contact information	
<i>Instructor's name</i> <i>Office address</i> <i>Office Hours</i> <i>Contact telephone number</i> <i>Email address</i>	Dr. Sarah Du EW 36 RM 175 W, 03:00 PM – 04:00 PM 561-297-3441 edu@fau.edu
5. TA contact information	
<i>TA's name</i> <i>Office Hours</i> <i>Email address</i>	
6. Course description	
A comprehensive introduction to microfluidics, micro-electro-mechanical systems (MEMS) and microfabrication techniques. Advanced topics on the applications of microfluidics and MEMS for bioengineering problems (bioMEMS). Topics include fluid properties, flow behavior, Electrokinetics, photolithography, soft lithography, flow control, manipulation and characterization of biological cells using engineered microdevices.	

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7. Course objectives/student learning outcomes/program outcomes	
<i>Course objectives</i>	This course is designed to introduce the students to science and technology of microfluidics, including concepts and principles of flow, transport and special phenomena at microscale, design and fabrication techniques, as well as the state-of-the-art applications of microfluidics for bioengineering problems. Students will evaluate the impacts of microfluidics and bioMEMS in life sciences.
<i>Student learning outcomes & relationship to ABET 1-7 objectives</i>	<ol style="list-style-type: none"> 1. The students will be familiar with the concepts of laminar flow, viscosity, surface tension, dimensionless numbers, Navier-Stokes equations. (ABET 1) 2. The students will be able to interpret principles in microfluidics and dimensionless numbers. (ABET 1) 3. The students will be able to list real-life applications of microfluidics and bioMEMS devices. (ABET 2) 4. The students will be able to design and fabricate simple microfluidic components and devices. (ABET 2) 5. The students will be able to perform microfluidic experiments and analyze the experimental results. (ABET 5, 6) 6. The students will be able to effectively communicate in scientific and technological endeavor through technical report writing. (ABET 3, 5)
8. Course evaluation method	
<p>Homework (4) (20%) Mid-term exam (30%) Lab reports (30%) Final group project (20%)</p> <p>The minimum grade required to pass the course is C.</p>	
9. Course grading scale	
Range	
> = 95	A
90-94	A-
85-89	B+
80-84	B
75-79	B-
70-74	C+

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65-69	C
60-64	C-
55-59	D+
50-54	D
45-49	D-
< 45	F

10. Policy on makeup tests, late work, and incompletes

Submission Deadline

All submissions to Canvas*.

*In terms of any emergency that may lead to delay for failure in online submission, submit to Dr. Du's email address: edu@fau.edu before the due date.

Late Submissions

Late work is NOT acceptable.

Make-up Exam Policy

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements.

11. Special course requirements

Access to COECS computer system.

12. Classroom etiquette policy

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.

Cell phones are not allowed during exams. If cell phones are detected during any exam periods, this will result in *a grade of "zero" on that exam and a note in the student's academic file.*

13. Disability policy statement

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS)—in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 110 (561-799-8585)—and follow all SAS procedures.

14. Honor code policy

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Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

No cell phones are allowed during exams (OME department policy)

15. Counseling and Psychological Services Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

16. Required texts/reading

No Required textbooks.

Reference books:

1. Albert Folch, 'Introduction to BioMEMS', CRC Press, 2012.
2. Nam-trung Nguyen, Seven Wereley, 'Fundamentals and Applications of Microfluidics', Artech house, 2006. (Please note: an electronic version of this book is available through FAU Electronic Resource General Collection).

Lectures, Web of Science, and electronic journals will be provided and shared through CANVAS.

17. Course topical outline, including dates for exams, papers, completion of reading

Course Topics:

1. Introduction to microfluidics
2. Fluid mechanics at small scales: scaling effects, dimensionless numbers, laminar flow, surface tension, capillary flow, fluids in electric fields
3. Materials and fabrication for MEMS and bioMEMS
4. Materials and fabrication for microfluidics
5. *Lab 1 - device fabrication*
6. Microfluidics for flow control: practical concerns, valves, pumps, gradient generator,

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mixers, microflow sensor

7. *Lab 2 – surface tension*
8. *Lab 3 – laminar flow and mixing*
9. Molecular biology on a chip
10. Cell-based chips: cell counting, sorting, trapping, cellular mechanics
11. Biomimetic chips: blood vessels, lung-on-a-chip

Test Dates:

1. Mid-term exam (open book)
2. Lab reports (3) - due within one week from lab date (online students, due within one week from video post)
3. Final group project
 - a. Mini literature review paper
 - b. Presentation