

## **BME 5704    Advanced Computational Methods for BME**

### **1. Description (3 credit hours)**

Covering advanced computational methods from a biomedical engineering perspective. Linear systems, numerical integration and differentiation, optimization, inverse problems and Fourier analysis will be discussed. This course is geared towards the applications of the advanced computational techniques to various biomedical engineering problems.

### **2. Pre-requisites and Co-requisites**

A basic knowledge of physics, calculus and computer programming is required. This can be met by PHY2048, MAC2311, and COP2271 or their equivalents.

### **3. Course Objectives**

- Develop an in-depth understanding of the theory underlying advanced computational methods in BME.
- Develop skills to apply computational theory in practice using software tools.

### **4. Contribution of course to meeting the professional component: N/A**

### **5. Relationship of course to program outcomes: N/A**

### **6. Instructor: David Gilland**

- a. Office location: Room 111 Bldg 1917 (BME/Medical Physics)
- b. Telephone: 352-273-0302
- c. E-mail address: gilland@ufl.edu
- d. Web site: [www.bme.ufl.edu/people/gilland\\_david](http://www.bme.ufl.edu/people/gilland_david)
- e. Office hours: email for appointment

### **7. Teaching Assistant: N/A**

### **8. Meeting Times: Tue. periods 8,9; Thu. period 8**

### **9. Class/laboratory schedule: course meets three, 50 minute sessions per week**

### **10. Meeting Location: 316 CHE**

### **11. Material and Supply Fees: None**

### **12. Textbooks and Software Required**

Title: *Numerical Recipes*

Authors: Press, Teukolsky, Vetterling, Flannery

Publication date and edition: 2007, 3<sup>rd</sup> edition

ISBN number: 978-0-521-88068-8

13. **Recommended Reading:** see 12 above

14. **Course Outline**

<b>Week</b>	<b>Topic</b>
1	Solving linear algebraic equations I
2	Solving linear algebraic equations II
3	Interpolation/extrapolation
4	Numerical integration/differentiation of functions I
5	Numerical integration/differentiation of functions II
6	Random number generation; root finding
7	Maximization/minimization of functions I
8	Maximization/minimization of functions II, Exam 1
9	Fourier analysis I
10	Fourier analysis II
11	Fourier applications
12	Statistical description of data I
13	Statistical description of data II
14	Modeling of data I
15	Modeling of data II, Exam 2

15. **Attendance and Expectations**

On time class attendance is mandatory. Chronic tardiness or absence will negatively impact the final grade.

Expectations:

- Be to class on time.
- no cell phone disruptions or e-device distractions.
- turn in homework on time and make legible
- better late than never
- ask for help if you need it

16. **Grading**

50% Homework

20% Exam 1

30% Exam 2

17. **Grading Scale**

A = 94 – 100

A- = 90 – 93.99

B+ = 87 – 89.99

B = 83 – 86.99

B- = 80 – 82.99

C+ = 77 – 79.99

C = 73 – 76.99  
C- = 70 – 72.99  
D = 61 – 69.99

Undergraduate students, in order to graduate, must have an overall GPA and an upper-division GPA of 2.0 or better (C or better). Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. Graduate students, in order to graduate, must have an overall GPA of 3.0 or better (B or better). Note: a B- average is equivalent to a GPA of 2.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

#### 18. **Make-up Exam Policy**

Exams can be rescheduled for an individual due to sickness or religious holidays. The instructor must be notified in advance.

#### 19. **Honesty Policy**

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

All work submitted in this course must be your own and produced exclusively for this course. ***In this class it is a violation of the Academic Honesty code to obtain assistance on homework assignments from students who have taken this class previously including the use of their software code.***

#### 20. **Accommodation for Students with Disabilities**

Students Requesting classroom accommodation must first register with the Dean of Students Office. That office will provide the student with documentation that he/she must provide to the course instructor when requesting accommodation.

#### 21. **UF Counseling Services** – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:

- UF Counseling & Wellness Center, 3190 Radio Rd, 392-1575, psychological and psychiatric services.
- Career Resource Center, Reitz Union, 392-1601, career and job search services.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling

22. **Software Use** – All faculty, staff and student of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.