

THE UNIVERSITY OF TEXAS AT EL PASO
COLLEGE OF SCIENCE
DEPARTMENT OF MATHEMATICAL SCIENCES

Course #: 28695
Course Title: CPS 5320: Advanced Scientific Computing
Credit Hrs: 3.0
Term: Spring 2018
Course Meetings & Location: MW 1:30 pm – 2:50 pm at Undergraduate Learning Center 216
Prerequisite Courses: CPS 5310 w/ C or better
Course Fee: Information available at CPS Program Office (Bell Hall 137)
Instructor: Dr. Michael Pokojovy
Office Location: Bell Hall 227
Contact Info: Phone: (915) 747-6761
E-mail address: mpokojovy@utep.edu
Fax # 915-747-6502 (Math Department)
Emergency Contact: 915-747-5761 (Math Department)
Office Hrs: MW 3:20 pm – 4:20 pm, by appointment or on a drop-in basis
Textbook(s), Materials: Required: PC or laptop with Matlab, R and C/C++ (with OpenMP, OpenACC and OpenMPI), Spark and Tensorflow

Recommended:

- 1) Edsberg, L. (2016): Introduction to Computation and Modeling for Differential Equations, 2nd ed., Wiley, Hoboken, NJ
- 2) Gentle, J. (2002): Elements of Computational Statistics, Springer, New York, etc.
- 3) Heath, M.T. (1997): Scientific Computing: An Introductory Survey, New York, NY
- 4) Kepner, J. (2009): Parallel MATLAB for Multicore and Multinode Computers, SIAM, Philadelphia, PA
- 5) Nassif, N., Erhel, J., Philippe, B. (2016): Introduction to Computational Linear Algebra, CRC Press, Boca Raton, etc.

Course Description and Contents:

Learning Outcomes: This course gives an overview of advanced computational science topics such as developing complex mathematical and statistical models, mathematical and statistical foundations of scientific computing (numerical methods and algorithms, etc.), data science and computational statistics (data mining and “big data” analytics, etc.), using modern programming languages for solving computational problems, high-performance computing (HPC), modern data visualization tools and techniques, etc.

Objectives and outcomes:

- Develop advanced modeling skills
- Learn theory and practice of scientific computing and data science
- Develop and improve serial and parallel programming skills
- Learn how to use HPC tools, libraries and techniques, etc.

Course Activities/Assignments: In addition to the core lecture, computer demonstrations and group discussions in the class, homework and/or project assignments will be given. It is expected that you spend an absolute minimum of 4 hours a week outside of class on solving homework problems and/or working on the projects, reviewing your class notes, etc. There will be one (final) exam at the end of the semester.

Assessment of Course Objectives: *Homework and projects:* At least one homework and/or project assignment will be given every 1-3 weeks. Please work independently! If you have questions, ask the instructor, not other students. NO late submissions will be accepted.

Final Exam: There will be a comprehensive final exam.

Only scientific calculators may be used (but not shared!) during the exam.

Course Schedule:

- Course duration: 1/17/2018 – 5/02/2018
- Spring Census Day: 1/31/2018
- Spring Break: 3/12/2018 – 3/16/2018
- Course drop/withdrawal deadline: 03/29/2018 (No “W” will be assigned for dropping the course after the deadline!)
- Final exam: 5/9/2018 at 4:00 pm – 6:45 pm

Grading Policy: *Homework, projects and class participation: 75%*
Final exam: 25%

The following grading scale will be used for this course:

90-100% guaranteed A
80-89% guaranteed B or better
70-79% guaranteed C or better
below 70% no guarantees

Academic performance in this class will be the only factor used in determining the course grade. No extra credit work will be available to improve on any grade.

Make-up Policy: There will be no make-up tests/exams.
Attendance Policy: It is highly recommended that you attend every class. If you miss a class, you will miss a lot of information. If you are unable to attend, you are still responsible for the material covered. Ask any of your classmates for their notes since the examples discussed in class may be used in the tests later. If you try to go from one class to another without studying, you will very likely be completely lost during the next class. Students are expected to arrive on time and remain in the class for the entire period. It is essential to pay attention in class and take legible notes. It is also important to read the textbook and work through the example problems given in the textbook and the class. Failure to accomplish the above – as a minimum – will almost invariably ensure a less than satisfactory grade for this course.

Academic Integrity Policy: The University policy is that all suspected cases or acts of alleged scholastic dishonesty must be referred to the Dean of Students for investigation and appropriate disposition. Any student who commits an act of scholastic dishonesty is subject to discipline. Scholastic dishonesty includes, but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts. Each student is responsible for notice of and compliance with the provisions of the Regents'

Rules and Regulations, which are available

for inspection electronically at

<http://www.utsystem.edu/bor/rules/homepage.htm>

All students are expected and required to obey the law, to comply with the Regents' Rules and Regulations, with System and University rules, with directives issued by an administrative official in the course of his or her authorized duties, and to observe standards of conduct appropriate for the University. A student who enrolls at the University is charged with the obligation to conduct himself/herself in a manner compatible with the University's function as an educational institution.

Any student who engages in conduct that is prohibited by Regents' Rules and Regulations, U. T. System or University rules, specific instructions issued by an administrative official or by federal, state, or local laws is subject to discipline, whether such conduct takes place on or off campus or whether civil or criminal penalties are also imposed for such conduct.

Civility Statement: Calculators may not be shared during quizzes and exams. Please do not use cell phones, pagers, iPods, MP3 players, blue tooth devices, etc. during class. Cell phones and pagers should be set to silent or vibrate, and any calls should be taken outside of class. Please do not wear headsets or blue tooth devices during class. Please don't talk in class. Cell phone calculators may not be used on quizzes or exams. Active participation in class is expected, teamwork in class will be implemented.

Disability Statement: If a student has or suspects she/he has a disability and needs an accommodation, he/she should contact The Center for Accommodations and Support services (CASS) at 747-5148 or at <cass@utep.edu> or go to Room 106 Union East Building. The student is responsible for presenting to the instructor any CASS accommodation letters and instructions.

Military Statement: If you are a military student with the potential of being called to military service and/or training during the semester, please contact me by the end of the first week of class