COMPUTATIONAL METHODS FOR ENGINEERS AND SCIENTISTS I
EGR 110 – 1 unit, Fall 2016

Department of Physics and Engineering, Point Loma Nazarene University

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Office Hours: MF 12:05 – 1:30 pm, W 12:05 – 12:30 pm,
R 9:30 – 11:00 am, 2:30 – 4:00 pm; or by appointment

Teaching Assistant: Dallas Probert Email: rdprobert025@pointloma.edu

Meeting Times: Lecture: T/R 11:00 am – 12:15 pm (RS 13)

Description: An introduction to techniques used in scientific analysis, including graphing of data, curve fitting, numerical methods of problem solution, error analysis, and the use of computers for solving problems in physics and engineering. Three hours laboratory each week. Offered on a Quad basis.

Necessary Equipment: For this course, you will need a scientific calculator. The minimum requirements of this calculator include trig functions, inverse trig functions, log, ln, and exponential functions. Two variate statistical functions (linear regression analysis) would also be very useful to have. You will also need to operate a personal computer using MS Excel. Excel is available on most campus computers.

Textbook: Reading materials will be provided on Canvas.

Learning Outcomes: In this course there are a number of specific goals for you to meet from each chapter. These smaller goals fit into the following overall course learning objectives. Once you complete this course, you should be able to:

1. translate the description of physics problems into the mathematical equations required to solve them using relevant physical principles
2. calculate solutions to physics problems once appropriate equations or techniques are identified
3. predict reasonable answers in appropriate problems, and assess the reasonableness of calculated answers
4. explain the physical meaning of the parameters in introductory physics equations
5. create and interpret graphical representations of physical quantities
6. gather and interpret data in a lab setting

University Mission: To Teach ~ To Shape ~ To Send. As with all courses at PLNU, this course supports the cause to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service becomes an expression of faith. Being of Wesleyan heritage, we aspire to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life. Within this broader mission, the Physics and Engineering Department at PLNU provides strong programs of study in the fields of Physics and Engineering. Our students are well prepared for graduate studies and careers in scientific and engineering fields. We emphasize a collaborative learning environment which allows students to thrive academically, build personal confidence, and develop

interpersonal skills. We provide a Christian environment for students to learn values and judgment, and pursue integration of modern scientific knowledge and Christian faith.

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Attendance and Participation: Attendance is expected at each class session. In the event of an absence you are responsible for the material covered in class and the assignments given that day. Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Undergraduate Academic Catalog. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Class Attendance in the Undergraduate Academic Catalog.

Academic Honesty: Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#Academic Honesty for definitions of kinds of academic dishonesty and for further policy information.

Academic Accommodations: If you have a diagnosed disability, please contact PLNU's Disability Resource Center (DRC) within the first two weeks of class to demonstrate need and to register for accommodation by phone at 619-849-2486 or by e-mail at DRC@pointloma.edu. See Disability Resource Center for additional information. For more details see the PLNU catalog. Students with learning disabilities who may need accommodations should discuss options with the instructor during the first two weeks of class. For more details see the PLNU catalog:http://catalog.pointloma.edu/content.php?catoid=24&navoid=1581#AcademicAccommodations

Class Enrollment: It is the student's responsibility to maintain his/her class schedule. Should the need arise to drop this course (personal emergencies, poor performance, etc.), the student has the responsibility to follow through (provided the drop date meets the stated calendar deadline established by the university), not the instructor. Simply ceasing to attend this course or failing to follow through to arrange for a change of registration (drop/add) may easily result in a grade of F on the official transcript.

Credit Hour: In the interest of providing sufficient time to accomplish the stated course learning outcomes, this class meets the PLNU credit hour policy for a 1 unit class delivered over 8 weeks. Specific details about how the class meets the credit hour requirements can be provided upon request.

Homework: Homework is due roughly each lecture. Homework is worth 40% of your final grade. Practicing working problems is critical to your success in the class, and completing this practice on time is important. Late work receives a 10% reduction in possible value per day.

Exams: There are two in-class quizzes; each is worth 15% of your grade. There is also a comprehensive final exam on the last day of quad 1 class. Exams are to be taken at the time indicated in the syllabus unless other arrangements are made in advance with the professor for some unavoidable circumstance, and otherwise cannot be made up. One must take all the exams in order to pass the class.

Final Exam: The final exam date and time is set by the university at the beginning of the semester and may not be changed by the instructor. This schedule can be found on the university website and in the course calendar. No requests for early examinations will be approved. Only in the case that a student is required to take three exams during the same day of finals week, is an instructor authorized to consider changing the exam date and time for that particular student.

Copyright Protected Materials: Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

Quiz and Final Exam: There will be three closed-book quizzes given in class and a comprehensive final exam at the last day of class. You must take ALL the quizzes and exam to pass the class.

Final Grade: The points you receive during the course are weighted accordingly:

Component	**Weight**
Homework / In-class Problems	40 %
Quiz	30 %
Final Exam	30 %

The grade you earn in this course is based on the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	D-
100-92	92-89.5	89.5-87	87-82	82-79.5	79.5-77	77-72	72-69.5	69.5-67	67-62	62-59.5

Course Schedule

September 1	Introduction / Graphing (Chapter 1)
September 6	Excel
September 8	Empirical Equations (Chapter 2)

September 13	Linear Regression Analysis (Chapter 3)
September 15	Linear Regression Analysis (Chapter 3) Continued
September 20	**Quiz 1** over Chapters 1-3
September 22	Approximate Solutions (Chapter 4)
September 27	Approximate Solutions (Chapter 4) Continued
September 29	Numerical Integration (Chapter 5)
October 4	Numerical Integration (Chapter 5) Continued
October 6	**Quiz 2** over Excel and Chapters 4 and 5
October 11	Series (Chapter 6)
October 13	Series (Chapter 6) Continued
October 18	**Comprehensive Final Exam**