Models of Motion, 2014-15

Program Syllabus – Spring Quarter Updates

sites.evergreen.edu/motion

Models of Motion is a full-time three-quarter long interdisciplinary program that integrates the study of calculus and physics and places them in their cultural and historical context as exemplars of human experience, endeavor, and achievement. Upon completion, students will have gained hands-on experience with and a working knowledge of scientific and mathematical concepts, an ability to reason critically about and solve applied and fundamental problems in physics and math, and an increased understanding of the development of human thinking about these topics.

Students continuing from winter have the option to choose any of the following portions of the program, in any combination they wish (except no student may join for just the independent project):

- 4 credits in Calculus III;
- 5 credits in Physics III with Lab;
- 4 credits in Analog Electronics with Lab
- 3 credits in Independent Project

Faculty

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Texts

Calculus: Strang, *Calculus*, 2nd ed
Physics: Mazur, *Principles and Practice of Physics*, 1st ed, plus **MasteringPhysics** access
Electronics: Mazur, *Principles and Practice of Physics*, 1st ed, plus **MasteringPhysics** access
Supplemental excerpts from Horowitz & Hill, *The Art of Electronics* and various (to be provided)

Weekly Schedule

Monday	Tuesday	Wednesday	Thursday
9:00 – 10:00 Quiz Lecture Hall 2	9:00 – 9:50 Calculus Problem Session Sem 2 C2105	9:00 – 10:15 Calculus Lecture Lab 1 2046	9:00 – 9:50 Calculus Problem Session Sem 2 C2105
10:15 – 11:30 Calculus Lecture Lecture Hall 2	10:00 – 10:50 Physics Problem Session Sem 2 C2105	10:30 – 11:45 Physics Lecture Lab 1 2046	10:00 – 10:50 Physics Problem Session Sem 2 C2105
		12:00 – 1:00 Project Reports Lab 1 2046	
1:00 – 3:00 Physics Lecture & Lab Lab 1 2046	1:00 – 2:00 Electronics Lecture Lab 1 2046		1:00 – 5:00 Electronics Lecture & Lab Lab 1 2046 (won't always run till 5:00 but need to reserve this time slot for when it does)
	3:00 – 4:30 Open Optional Project Time Lab 1 2046		

Schedule of reading assignments (subject to change)

Week	Calculus (Strang)	Physics (Mazur)	Electronics	Notes
21	9.1, 9.2, 9.3, 9.4	Ch. 15	Mazur Ch. 31	
22	10.1, 10.2, 10.3	Ch. 19	TBA	
23	10.4, 11.1, 11.2	Ch. 20	TBA	
24	11.3, 12.1, 12.2, 12.3	Ch. 21	TBA	
25	--	--	TBA	Midterm Exams
26	13.1, 13.2, 13.3	Ch. 16	TBA	
27	13.4, 13.5, 13.6	Ch. 17	TBA	
28	14.1, 14.2	Ch. 33	TBA	
29	14.3, 14.4	Ch. 34	TBA	Mon. May 25: Memorial Day, no class meetings; Fri. May 29 & Sat. May. 30: Science Carnival
30	--	--	--	Final Exams; Project Write-ups due
Evaluation Week				

Activities, Assignments, and Assessments

- Calculus: ***Lectures***, ***Problem Sessions***. ***Reading Assignments***, ***Problem Sets***. ***Quizzes, Exams***.
- Physics: ***Lectures***, ***Labs, Problem Sessions***. ***Reading Assignments***, ***Problem Sets***. ***Quizzes, Exams***.
- Electronics: ***Lectures***, ***Labs***. ***Reading Assignments***, ***Problem Sets***. ***Exams***.
- Project: ***Benchmarks (Proposal, Plan, Updates), Reports, Science Carnival Presentation, Project Write-up***.
- All students will attend Science Carnival at the end of week 29, particularly attending 2 presentations from Models of Motion and 2 presentations from Physical Systems and Applied Math.
- Throughout the quarter, you will maintain a ***Portfolio*** of your work, due at the end of the quarter.
- Refer to the Fall Quarter Syllabus, program web site, and associated handouts for details of above.

Program Learning Goals

Through your work in spring quarter, you will have the opportunity to:

- Improve your ability to articulate and assume responsibility for your own work.
- Strengthen your collaborative skills and the ability to respond in useful ways to the work of colleagues.
- Improve your skills in clear communication of mathematical and scientific ideas, both orally and in writing.

- Deepen your prerequisite understanding of differential and integral calculus.
- Learn about: polar coordinates, polar equations, and complex numbers; infinite series; vectors and motion along a curve; partial derivatives; and multiple integrals.
- Use calculus in applied problems, particularly in the context of the physical sciences.

- Solidify your prerequisite understanding of concepts and problem solving related to classical mechanics.
- Experience that physics is both a mathematical and an experimental science.
- Use the main ideas of thermodynamics and waves & optics to solve fundamental and applied problems.

- Develop experience using approximation techniques to do quick “back-of-the-envelope” engineering calculations.
- Gain exposure to basic electronic test & measurement equipment and circuit prototyping.
- Learn the basics of electronic circuits, the basis of much of the technology in the modern world.

Our work will take place in the context of an Evergreen learning community, and we will be responsible for our interactions within the group as well as our individual learning. In this context, it is important to keep in mind the institutional-level expectations and approaches that form the backdrop of our work together. These are articulated by the College in terms of the “Expectations of an Evergreen Graduate” and “Five Foci of Learning”.

In all areas of the program, credit will be earned based on your:

- **demonstrated understanding of the material;**
- **timely submission of assignments;**
- **engagement (including attendance, participation, and effort).**

All of these will be evaluated with the program learning goals in mind.