UBC Curriculum Proposal Form
Change to Course or Program

Category: (2)

Faculty: Science **Department: Physics and Astronomy**	**Date: Oct 21, 2009** **Contact Person: R. Kiefl** **Phone: 2-3037** **Email:** Kiefl@triumf.ca
Effective Session: 10W **Proposed Calendar Entry:** ASTR 303 (3) Extragalactic Astronomy Properties of normal galaxies, elements of stellar dynamics; galactic evolution, active galaxies and quasars. [3-0-0] Pre-req: ASTR 102 or ASTR 202 is recommended.	**Present Calendar Entry:** ASTR 303 (3) Extragalactic Astronomy Properties of normal galaxies, elements of stellar dynamics; galactic evolution, active galaxies and quasars. [3-0-0] Pre-reqs: ~~One of PHYS 206, PHYS 216.~~ ~~(~~ASTR 102 or ASTR 202 is recommended.~~)~~ **Action:** Remove PHYS 206 or 216 as a prerequisite. Ra**tionale:** ASTR 303 no longer requires PHYS 206 or PHYS 216. The essential elements of classical mechanics required for ASTR 303 are now an integral part of the course. **Faculty Approval Date:**

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Effective Session: 10W **Proposed Calendar Entry:** ASTR 404 (3) Astronomical and Astrophysical Measurements. … *Prerequisite:* **PHYS 408, PHYS 210** and one of PHYS 312, MATH 316.	**Present Calendar Entry:** ASTR 404 (3) Astronomical and Astrophysical Measurements … *Prerequisite:* ~~PHYS 308~~ and one of PHYS 312, MATH 316. **Action:** Revise the prerequisites. Replace PHYS 308 with PHYS 408 and add PHYS 210 . Ra**tionale:** PHYS 308 is no longer offered and has been replaced by PHYS 408 in the Astronomy programs. Most students in the course have taken PHYS 210 since it is required in all the Astronomy programs. However a few students (ie. transfers) arrive without a proper background in computing. The addition of PHYS 210 ensures these students have sufficient background to attempt this course. **Faculty Approval Date:**

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Category: (1)

Faculty: Science **Department: Physics and Astronomy** **Faculty Approval Date:** **Effective Session 2009W Term 2** **Year 2009 for Change**	**Date: Oct 21, 2009** **Contact Person:** **Janis McKenna or Rob Kiefl** **Phone: 2-4337 (Janis)** **2-3037 (Kiefl)** **Email: janis@physics.ubc.ca** **kiefl@triumf.ca**
Effective Session 09W, term 1 **Proposed Calendar Entry:** **PHYS 490 (3)** **Student Directed Seminars Self-directed, collaborative studies, in a group-learning environment, initiated and coordinated by senior undergraduate students with the supervision of a faculty advisor. Course structure, enrolment and delivery methods will comply with the Handbook for Student Directed Seminars".** **[3-0-0]**	**URL:** None – new course **Present Calendar Entry:** None – new course **Type of Action:** Add new undergraduate course **Rationale:** The Student Directed Seminars Program is a student-driven program that offers students an opportunity to initiate and coordinate small, collaborative, group learning experiences. It is an expansion of the directed studies option offered by most departments. The proposed SDS course complies with the UBC "Handbook for Student Directed Seminars". http://leap.ubc.ca/files/2005/08/sdshandbook2009.doc which states that any course must be approved by the UBC SDS program administration prior to each offering. An SDS course, PHYSICS AND SOCIETY has been approved by the SDS and will be offered in January 2010. This SDS course needs a course number for registration and for all future SDS's in Physics.

Supporting documentation:

Course Learning Objectives:

A student (or group of students), in the third year of undergraduate study or higher, proposes a course not currently offered at UBC. If a professor agrees to sponsor the proposal, the student proceeds to develop a course outline under the guidance of this faculty sponsor. The Student Directed Seminars Advisory Committee considers all UBC-wide SDS submissions course outlines for final approval. If approved, the student-initiated course is advertised to the general student body, as an upper level 3 credit course.

The course will be of interest to senior students with a suitable background preparation for the course.

Course to be offered in Term 2, 09W

This course has already been granted approval by the SDS Advisory Committee and is ready to be offered, with Physics Undergraduate Student Tess Baker as Student Coordinator, and Janis McKenna and Chris Waltham as Faculty Advisors.

The course will be 3 credits, graded Pass/Fail, in accordance with the format and grading scheme for most of the other SDS courses already approved in the Faculty of Science: CPSC 490, GEOB 490, EOSC 490, BIOL 490 and ATSC 490.

The following is the SDS proposal for PHYS 490 submitted by Tess Baker, in consultation with McKenna and Waltham. (slightly modified for clarity for Curriculum committees)

Physics and Society: A Student Directed Seminar

Course Content

This course is designed to look at major issues in our world through a physics-based lens. The breakdown of topics is as follows, with some variation based on what the students enrolled in the seminar would like to focus on. Treatment of these topics is covered later in the proposal. Associated readings for course sections are listed in italics.
Energy: (The coordination team for the course decided that a strong understanding of existing energy sources is crucial to understand the physics of the alternatives.)

- Renewable energies: **MacKay, Chapter 1*
    - Wind
    - Solar
    - Tidal
    - Hydroelectric
    - Bio-fuel

    - Geo-thermal
- Non-Renewable energies:
    - Tar Sands
    - Gas
    - Coal (including Carbon Sequestration)
    - Oil
    - Nuclear **Muller, Chapter 5*

Climate Change: **Muller, Chapter 10*

- Altmospheric Physics
    - Thermodynamics
- Modelling
    - Intergovernmental Panel on Climate Change Reports
    - Anthropogenic vs. Natural Climate Change
- Historical Climate Data
    - Means of Collection
    - Credibility

Energy and Resource Consumption **MacKay, Chapter 2*

- Technologies to increase energy efficiency
- Areas of improvement

Nuclei and Radioactivity **Muller, Chapter 4, *Garwin and Charpak, Chapters 1,2, 5, 6,8*

- Nuclear Power generation **MacKay, Chapter 5,*
- **Garwin and Charpak, Chapters 5, 6 & 9*
- "Nuclear" Weapons **Garwin and Charpak, Chapters 3 and 11*
- Radioactive Waste

Geo-Engineering

Applications of Physics to Medicine

- Medical Imaging
- Cancer Therapy

As a basis for these topics, we've decided on three main textbooks:

1. *Physics for Future Presidents*, by Richard Muller
    - This is a course textbook for a course by the same name at UC Berkeley, taught by Muller. It examines nuclear non-proliferation, energy, climate change, global warming, terrorism, nuclear power/nuclear weapons, space exploration, and several other topics relevant to our theme of Physics and Society.
2. *Megawatts and Megatons: the Future of Nuclear Power and Nuclear Weapons,* by Richard Garwin and Georges Charpak
    - This will provide an in-depth look at nuclear power and nuclear weapons.
3. *Sustainable Energy -- Without the Hot Air*, by David MacKay
    This is a course textbook, available for free download:

In an effort to keep this seminar *student-directed*, many of the readings will be decided by the students themselves, as part of their seminars. See below for an explanation of course structure. These readings will include journal articles as well.
We will expect students to have a basic knowledge of the laws and applications of physics (through first-year physics courses).
This course is designed for any physics student looking to ground his or her degree in order to tackle immediate social and environmental issues. It will not, however, be limited to physics majors, as interdisciplinary discussion would enhance the course content.

Course Structure/Format
The seminar will meet twice a week.
The format of the course is as follows: each student is required to choose two topics (topics will be listed) at the start of the semester. Then each student leads/presents a seminar on topic 1. This seminar will require some research on behalf of the student presenter, and all students will participate in discussion, facilitated by the student presenter. A term paper will be written by the seminar-leader on topic 1. As well, each student prepares a poster presentation on topic 2. Two to three poster sessions will take place in class meetings towards the end of the term
As well, there will be UBC-and-TRIUMF-based guest speakers for the first two weeks of classes, to allow students time to prepare their seminars. These guest speakers will be coordinated by both myself (coordinator) and the professor sponsors. Some initial ideas include: Prof Waltham (topic: Climate Change), Stan Yen (the Chernobyl Accident; play by play), Janis McKenna (guides on posters, presentations and paper writing, as well as a topic: Clean Energy and/or Nuclear Physics). Depending on the number of students registered, "extra" classes will be used for field trips, most likely including one to TRIUMF, here on campus: Canada's National Laboratory for Nuclear and Particle Physics.
Course Components and Evaluation

Course Components: Student must pass each component to pass the course. Components will be graded separately, but the final mark will then be converted to Pass/Fail:

5%	1. outline and annotated bibliography for seminar and paper on topic 1 (instructor-assessed).
5%	2. outline and annotated bibliography for poster, on topic 2 (instructor-assessed)
20%	3. class seminar/presentation on topic 1 (peer-assessed)
30%	4. term paper on topic 1 (same topic as seminar/presentation (preceded by outline an annotated bibliography) (instructor-assessed with student involvement in rubric, sample guideline rubric will be the same as that used in PHYS 348)
20%	5. poster session presentation - on topic 2 (preceded by outline an annotated bibliography) (peer-assessed)

20% 6. participation(peer-assessed) (incl. 5% for attendance, 10% in-seminar participation, and 5% for assessment of peers posters)

Because students are essentially being marked relative to one another (by peers), there is incentive to plan and run the classes smoothly and in a challenging manner. The quality of discussion will depend on the facilitator's questions and on input from students.

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Effective Session: 10W **Proposed Calendar Entry:** PHYS 403 (3) Statistical Mechanics. … Pre-reqs: One of PHYS 203, PHYS 257, CHEM 201 and one of PHYS 304, PHYS 450, CHEM 312. **One of MATH 318 , STAT 241, STAT 251 is recommended.**	**Present Calendar Entries:** PHYS 403 (3) Statistical Mechanics. … Pre-reqs: One of PHYS 203, PHYS 257, CHEM 201 and one of PHYS 304, PHYS 450, CHEM 312. ~~Math 318 is recommended.~~ **Action:** Add STAT 241 or STAT 251 as a recommended prerequisite. **Rationale:** STAT 241 or STAT 251 is a suitable substitute for MATH 318 as a recommended prerequisite for this course. **Faculty Approval Date:**

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Faculty: Science **Department:** Physics and Astronomy	**Date:** October 21, 2009 **Contact Person:** Rob Kiefl **Phone:** 822 3037 **Email:** kiefl@triumf.ca
Effective Date for Change: 10W **Proposed Calendar Entry:** Major (0030): Astronomy (ASTR) First Year … CHEM 121 (111) 4 …	**URL:** **http://www.students.ubc.ca/calendar/index.cfm?tree=12,215,410,415** **Present Calendar Entry:** Major (0030): Astronomy (ASTR) First Year … CHEM 121 (111~~,113~~) 4 … **Action:** Remove CHEM 113 as a possible substitute for CHEM 121 in first year. **Rationale:** For students without CHEM 12 CHEM 111 provides an adequate background in Chemistry for this program.