

Ogden College of Science and Engineering  
Western Kentucky University  
Office of the Dean  
745-6371

**REPORT TO THE GRADUATE COUNCIL COMMITTEE**

DATE: April 25, 2014  
FROM: Ogden College of Science and Engineering

The Ogden College of Science and Engineering submits the following items for consideration at the May meeting:

Consent	<b>Proposal to Revise Course Number</b> PSYS 430G, Psychology of Women Contact Person: Sharon Mutter, sharon.mutter@wku.edu, 54389
Consent	<b>Proposal to Revise Course Number</b> PSYS 485G, Psychology of Religion Contact Person: Sharon Mutter, sharon.mutter@wku.edu, 54389
Action	<b>Proposal Create a New Course</b> PHYS 425G, Introduction to Materials Science Contact Person: Sanju Gupta, sanju.gupta@wku.edu, 55940
Action	<b>Proposal Create a New Course</b> PHYS 799, Doctoral Research Contact Person: Vladimir Dobrokhotov, vladimir.dobrokhotov@wku.edu, 54357

**MINUTES – OCSE Graduate Curriculum Committee**

**March 28, 2014**

**Members Present:** Dr. David Keeling, Dr. Martin Stone, Dr. Ivan Novikov, Dr. Ferhan Atici, Dr. Raja Dakshinamurthy, Dr. Daniel Jackson, Dr. Shane Palmquist, Dr. Sharon Mutter

Cathleen Webb, Chair

This meeting was held via email.

Novikov/Smith moved for approval of holding the meeting via email, motion approved.

**OLD BUSINESS**

There was no motion for approval of the minutes from the February 28th, 2014 meeting. Minutes will need to be approved at the April meeting.

**NEW BUSINESS**

**Consent Agenda**

Stone/Xia moved for approval to bundle the consent items. Motion approved.

**Action Agenda**

Stone/Smith moved to bundle and approval of the Action Items. Motion approved with suggested amendments.

**MINUTES – OCSE Graduate Curriculum Committee**

**February 28, 2014**

**Members Present:** Dr. David Keeling, Dr. Martin Stone, Dr. Ivan Novikov, Dr. Ferhan Atici, Dr. Raja Dakshinamurthy, Dr. Daniel Jackson, Dr. Shane Palmquist, Dr. Sharon Mutter

Cathleen Webb, Chair

This meeting was held via email.

**OLD BUSINESS**

Keeling/Dakshinamurthy moved for approval of the minutes from the January 31, 2014 meeting. Motion approved.

**NEW BUSINESS**

**Consent Agenda**

Keeling/Dakshinamurthy moved for approval of the Consent Item accepted. Motion approved.

**Action Agenda**

**Mathematics**

Keeling/Dakshinamurthy moved for approval of the Action Items. Motion approved with suggested amendments.

Proposal to Revise a Program, Math 085, Master of Science in Mathematics

Proposal to Revise Course Credit Hours, Math 598, Communicating Mathematics and Technical Writing

Proposal Date: April 2, 2014

**Ogden College of Science and Engineering  
Department of Psychological Sciences  
Proposal to Revise Course Number  
(Consent Item)**

Contact Person: Sharon A. Mutter, email: [sharon.mutter@wku.edu](mailto:sharon.mutter@wku.edu), phone: 5-4389

**1. Identification of proposed course**

- 1.1 Course prefix (subject area) and number: PSYS 430G
- 1.2 Course title: PSYCHOLOGY OF WOMEN

**2. Proposed course number: PSYS 453G**

**3. Rationale for revision of course number:** A new course numbering system was developed for the Department of Psychological Sciences and this change is required in order to make the number for this course consistent with this system.

**4. Proposed term for implementation: Fall 2014**

**5. Dates of prior committee approvals:**

Department of Psychological Sciences  
OCSE Graduate Curriculum Committee  
Graduate Council  
University Senate

4/11/14

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Proposal Date: April 2, 2014

**Ogden College of Science and Engineering  
Department of Psychological Sciences  
Proposal to Revise Course Number  
(Consent Item)**

Contact Person: Sharon A. Mutter, email: [sharon.mutter@wku.edu](mailto:sharon.mutter@wku.edu), phone: 5-4389

**1. Identification of proposed course**

- 1.1 Course prefix (subject area) and number: PSYS 485G
- 1.2 Course title: PSYCHOLOGY OF RELIGION

**2. Proposed course number: PSYS 451G**

**3. Rationale for revision of course number:** A new course numbering system was developed for the Department of Psychological Sciences and this change is required in order to make the number for this course consistent with this system.

**4. Proposed term for implementation:** Fall 2014

**5. Dates of prior committee approvals:**

Department of Psychological Sciences  
OCSE Graduate Curriculum Committee  
Graduate Council  
University Senate

4/11/14

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Proposal Date: February 03, 2014

Ogden College of Science and Engineering  
Department of Physics & Astronomy  
Proposal to Create a New Course  
(Action Item)

Contact Person: Sanju Gupta, [sanju.gupta@wku.edu](mailto:sanju.gupta@wku.edu), (270) 745-5940

1. Identification of proposed course:

- 1.1 Course prefix and number: **PHYS425G (/ PHYS425)**
- 1.2 Course title: **Physics of Materials Science**
- 1.3 Abbreviated course title: **Phys Mat Sci**
- 1.4 Credit hours and contact hours: **3**
- 1.5 Type of course: **C**
- 1.6 Prerequisite(s): **PHYS321, MATH 237**
- 1.7 Corequisite(s): **PHYS440, MATH 331**
- 1.8 **Course catalog listing:** This course investigates the fundamental quantum physics of bonding, energetics and structure that underpins the foundation of the physics of materials. The physical properties of nanomaterials and their corresponding applications will be explored using the principles of quantum physics. Materials examined include engineered metal alloys, electronic and magnetic materials, ionic and network solids, ceramics, polymers, and biomaterials at all length scales.

2. Rationale:

- 2.1 **Reason for developing the proposed course:** Students will benefit from a course on novel materials complemented with nanotechnology applications. They will obtain the knowledge and skills necessary for work at academic research laboratories, national laboratories and industrial facilities using state-of-the art procedures to produce: synthetic nanomaterials, electro-ceramics, multiferroics, stronger composites with polymers, and energy harvesting structures. This course will allow students to be exposed to and become knowledgeable about the rapidly growing area of the quantum properties of materials, especially students who are interested in pursuing graduate studies in physics and materials science and students who are in the M. Phil program, currently being developed at WKU.
- 2.2 **Projected enrollment in the proposed course:** 6-8 students per offering based on previous enrollment in Solid-State Physics course.
- 2.3 **Relationship of the proposed course to courses now offered by the department:** The proposed course builds on the basic concepts discussed in PHYS 321 and PHYS 440. However, there is only a minimal overlap between the content of PHYS 425 and that of any other physics course currently offered by the department. This course will be offered on a rotating basis *i.e.* every other Fall or Spring semester. The course PHYS 425G is intended for students in the Masters in Homeland Security Sciences Program, for these students there will be an extra component in the course requiring reading and presenting of current research papers.

2.4 **Relationship of the proposed course to courses offered in other departments:**  
This course in the physics of materials science focuses on the detailed quantum structural and physical properties of technologically significant materials at all length scales: from bulk solids to low-dimension or nanoscale materials. It complements the chemistry course, CHEM 490 Materials Chemistry in the Department of Chemistry, by providing a quantum physics approach to materials formation and function using MATH 237 tools. Since the proposed course will be offered on alternative Spring odd years, it will be considered as an equivalent elective to CHEM 490 for students in the physics major.

2.5 **Relationship of the proposed course to courses offered in other institutions:** A course on the physics of materials is offered in the Department of Physics and/or Department of Materials Science & Engineering at several universities in the United States, MIT and Cornell offer a physics of materials and a solid state course for undergraduate physics majors. MTSU specializes in digital electronic material devices and solid state materials, UK has a series of courses on materials in engineering, chemistry and physics. Students who are interested in research experience through the summer NSF-REU programs at other institutions will be better prepared through this course.

### 3. Discussion of proposed course:

3.1 **Course objectives:** This course is designed to study the quantitative aspects of novel materials and their applications. Upon completion of this course, the students will acquire a calculus based quantitative understanding of the structural and physical properties of both the traditional and technologically important advanced functional materials at the nanoscale to help meet the demands of our modern digital age and the wide range of high-tech applications.

3.2 **Content outline:** A general framework from the abovementioned textbook is as follows:

- ❖ **Atomic Structure and Interatomic Bonding**
- ❖ **The Structure of Crystalline and Non-crystalline Solids**
- ❖ **Solidification, Crystalline imperfections/defects, and Diffusion in Solids**
- ❖ **Phase Diagrams and Phase Equilibrium** (of unary and multi-component systems and Gibbs phase rule)
- ❖ **Types of Nanomaterials and Applications** 0D (quantum dots), 1D (nanotubes), 2D (planar sheets), 3D (mesoscopic), hybrid systems, Energy and biological-related applications
- ❖ **Electrical and Thermal Properties of Bulk Solids and Nanomaterials**
- ❖ **Semiconductor Materials** (Electronic Properties)
- ❖ **Ceramic Materials** (traditional and advanced electro-ceramics, silicate structures) their processing and physical properties
- ❖ **Polymeric Materials** (types of polymers, polymerization reactions and deformation, advanced polymers, soft- and bio-materials)
- ❖ **Magnetic Materials** (dia-, para-, ferro-, antiferro-, ferri-), soft and hard magnets, magnetic storage, superconductivity and topological insulators

- ❖ **Optical Properties** (basics include electromagnetic radiation and light interaction with solids – absorption, reflection, refraction, and transmission, applications of optical phenomena – photoluminescence and stimulated emission of radiation *i.e.* lasers, metamaterials)
  - ❖ **Composite Materials** (particulate- and fiber-reinforcements forming bulk and nanoscale composites) and **Mechanical Properties**
  - ❖ **Modification of Physical Properties Through Changes in Environment and Microstructure** thus establishing *Property-Microscopic structure-Processing-Functionality* relationship
- 3.3 **Student expectations and requirements:**  
Performance will be evaluated based upon examinations, classroom discussion, field trips, and term paper presentation.
- 3.4 *Materials Science and Engineering: An Introduction* by William D. Callister Jr. and David G. Rethwisch, 9<sup>th</sup> Ed. John Wiley & Sons, Inc. New York, 2013.  
ISBN-10: 1118324579 | ISBN-13: 978-1118324578.

**Bibliography:**

*Introduction to Materials Science for Engineers*, James F. Shackelford, 7<sup>th</sup> Ed. Prentice-Hall, Upper Saddle River, New Jersey, 2008.  
*Principles of Materials Science and Engineering*, William F. Smith, McGraw-Hill, Inc. 3<sup>rd</sup> Ed. New York, 1999.

**4. Resources:**

- 4.1 Library resources: See attached library resource form and bibliography.
- 4.2 Computer resources: No new additional resources required.

**5. Budget implications:**

- 5.1 Proposed method of staffing: Existing faculty will teach this course.
- 5.2 Special equipment needed: None
- 5.3 Expendable materials needed: None
- 5.4 Laboratory materials needed: None

**6. Proposed term for implementation:** Spring 2015

**7. Dates of prior committee approvals:**

Department of Physics & Astronomy	_____
	March 31, 2014
OCSE Graduate Curriculum Committee	_____
Graduate Council	_____
University Senate	_____

**Attachment: Bibliography**

Proposal Date: March 5, 2014

Ogden College of Science and Engineering  
Department of Physics & Astronomy  
Proposal to Create a New Course  
(Action Item)

Contact Person: Vladimir Dobrokhotov, (270) 745-4357

1. Identification of proposed course:

- 1.1 Course prefix and number: **PHYS 799**
- 1.2 Course title: **Doctoral Research**
- 1.3 Abbreviated course title: **Doct. Res.**
- 1.4 Credit hours and contact hours: (1-6) **1-6**
- 1.5 Type of course: **C**
- 1.6 Prerequisites: **doctoral candidacy**
- 1.7 Co-requisite: **none**
- 1.8 Course catalog listing: **Doctoral Research/Physics.**

Prerequisite: Admission to candidacy in collaborative doctoral program. Research undertaken to complete requirements for the doctoral program. Pass/Fail grading.

2. Rationale:

- 2.1 **Reason for developing the proposed course:** WKU faculty supervising doctoral students as adjunct professors through established collaborative research initiatives and programs require a mechanism for tracking work load. They also need written documentation showing work effort that is used to provide data in grant submissions and support reports that reflect this level of effort.
- 2.2 **Projected enrollment in the proposed course:** 1-5.
- 2.3 **Relationship of the proposed course to courses now offered by the department:** none
- 2.4 **Relationship of the proposed course to courses offered in other departments:** Similar courses exist in other programs, such as CHEM 799.
- 2.5 **Relationship of the proposed course to courses offered in other institutions:** similar courses exist at institutions where external faculty is involved in graduate degree programs.

3. Discussion of proposed course:

- 3.1 **Course objectives:** to be used during the research phase of a doctoral program.
- 3.2 **Content outline:** research at the level and intensity appropriate for progress towards a doctoral degree.
- 3.3 **Student expectations and requirements:** Performance will be evaluated based upon research progress.

4. **Resources:** none

5. **Budget implications:**

5.1 Proposed method of staffing: Existing graduate faculty who are who hold an adjunct position at the collaborative institution will teach this course.

5.2 Special equipment needed: None

5.3 Expendable materials needed: None

5.4 Laboratory materials needed: None

6. **Proposed term for implementation:** Fall 2015

7. **Dates of prior committee approvals:**

Department of Physics & Astronomy 04/02/2014

OCSE Graduate Curriculum Committee \_\_\_\_\_

Graduate Council \_\_\_\_\_

University Senate \_\_\_\_\_