**Ogden College of Science and Engineering**

**Office of the Dean**

**745-4449**

**REPORT TO THE UNIVERSITY CURRICULUM COMMITTEE**

Date: January 15, 2015

The Ogden College of Science and Engineering submits the following action items for consideration at the January 2015, UCC meeting:

1. New Business

|  |  |
| --- | --- |
| **Type of item** | **Description of Item & Contact Information** |
| Action | **Proposal to Make Multiple Revisions to a Course**  CS 181, Computer Science II, 4 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Make Multiple Revisions to a Course**  CS 280, Computer Science III, 3 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Make Multiple Revisions to a Course**  CS 380, Data Structures and Algorithm Analysis, 3 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Create a New Course**  CS 351, Database Management Systems I, 3 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Revise a Program**  Ref. 629P/629, Major in Computer Science, 44-50 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Revise a Program**  Ref. 341, Minor in Computer Science, 23 hrs.  Contact: Huanjing Wang, [Huanjing.wang@wku.edu](mailto:Huanjing.wang@wku.edu), x 2672 |
| Action | **Proposal to Create a New Course**  PHYS 425, Physics of Material Science, 3 hrs.  Contact: Sanju Gupta, [Sanju.gupta@wku.edu](mailto:Sanju.gupta@wku.edu), x5940 |

October 4, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Make Multiple Revisions to a Course**

**(Action Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1. Identification of course:**

* 1. Current course prefix (subject area) and number: CS 181
  2. Course title: Computer Science II

**2. Revise course title:** NA

* 1. Current course title:
  2. Proposed course title:
  3. Proposed abbreviated title:
  4. Rationale for revision of course title:

**3. Revise course number:**

* 1. Current course number: CS 181
  2. Proposed course number: CS 221
  3. Rationale for revision of course number:

The revision of course number is consistent with the ongoing restructuring of the computer science undergraduate program.

**4. Revise course prerequisites/corequisites/special requirements:**

4.1 Current prerequisites/corequisites/special requirements:

PHIL 215 and CS 180 with grades of C or better, and eligibility to enroll in a calculus course based on criteria developed by the Department of Mathematics

4.2 Proposed prerequisites/corequisites/special requirements:

CS 180 with grade of C or better, and eligibility to enroll in a calculus course based on criteria developed by the Department of Mathematics

4.3 Rationale for revision of course prerequisites/corequisites/special requirements:

PHIL 215 teaches logic. Logic is pre-knowledge for CS 338 rather than CS 181. PHIL 215 will become a prerequisite for CS 338.

4.4 Effect on completion of major/minor sequence:

None

**5. Revise course catalog listing:** NA

* 1. Current course catalog listing:
  2. Proposed course catalog listing:
  3. Rationale for revision of course catalog listing:

**6. Revise course credit hours:** NA

* 1. Current course credit hours:
  2. Proposed course credit hours:
  3. Rationale for revision of course credit hours:

**7.** **Revise grade type:** NA

7.1 Current grade type:

7.2 Proposed grade type:

7.3 Rationale for revision of grade type:

**8. Proposed term for implementation:**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | October 21, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

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October 4, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Make Multiple Revisions to a Course**

**(Consent Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1. Identification of course:**

* 1. Current course prefix (subject area) and number: CS 280
  2. Course title: Computer Science III

**2. Revise course title:** NA

* 1. Current course title:
  2. Proposed course title:
  3. Proposed abbreviated title:
  4. Rationale for revision of course title:

**3. Revise course number:**

* 1. Current course number: CS 280
  2. Proposed course number: CS 338
  3. Rationale for revision of course number:

CS 338 was renumbered to CS 280 in Fall 2011. The change from CS 338 to CS 280 caused unexpected problems with the CS minor, so we have decided to revert to the previous numbering.  In fact, the 300 level is more appropriate for the material being covered, and the majority of students enrolling in this course (83% in Spring 2014) have junior status.

**4. Revise course prerequisites/corequisites/special requirements:**

4.1 Current prerequisites/corequisites/special requirements:

A grade of "C" or better in CS 181 and MATH 136

4.2 Proposed prerequisites/corequisites/special requirements:

A grade of "C" or better in CS 221, PHIL 215, and MATH 136

4.3 Rationale for revision of course prerequisites/corequisites/special requirements:

CS 181 has been renumbered CS 221. PHIL 215 teaches logic, which provides a basis for understanding the content of CS 338.

4.4 Effect on completion of major/minor sequence:

None

**5. Revise course catalog listing:** NA

* 1. Current course catalog listing:
  2. Proposed course catalog listing:
  3. Rationale for revision of course catalog listing:

**6. Revise course credit hours:** NA

* 1. Current course credit hours:
  2. Proposed course credit hours:
  3. Rationale for revision of course credit hours:

**7.** **Revise grade type:** NA

7.1 Current grade type:

7.2 Proposed grade type:

7.3 Rationale for revision of grade type:

**8. Proposed term for implementation:**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | October 21, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

October 4, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Make Multiple Revisions to a Course**

**(Action Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1. Identification of course:**

* 1. Current course prefix (subject area) and number: CS 380
  2. Course title: Data Structures and Algorithm Analysis

**2. Revise course title:** NA

* 1. Current course title:
  2. Proposed course title:
  3. Proposed abbreviated title:
  4. Rationale for revision of course title:

**3. Revise course number:**

* 1. Current course number: CS 380
  2. Proposed course number: CS 421
  3. Rationale for revision of course number:

The revision of course number is consistent with the ongoing restructuring of the computer science undergraduate program. No other CS courses use this course as a prerequisite.

**4. Revise course prerequisites/corequisites/special requirements:**

4.1 Current prerequisites/corequisites/special requirements:

A grade of “C” or better in CS 280 and STAT 301

4.2 Proposed prerequisites/corequisites/special requirements:

A grade of “C” or better in CS 338 and STAT 301

4.3 Rationale for revision of course prerequisites/corequisites/special requirements:

The revision of course prerequisites is consistent with the renumbering of CS 280 to CS 338.

4.4 Effect on completion of major/minor sequence:

None

**5. Revise course catalog listing:** NA

* 1. Current course catalog listing:
  2. Proposed course catalog listing:
  3. Rationale for revision of course catalog listing:

**6. Revise course credit hours:** NA

* 1. Current course credit hours:
  2. Proposed course credit hours:
  3. Rationale for revision of course credit hours:

**7.** **Revise grade type:** NA

7.1 Current grade type:

7.2 Proposed grade type:

7.3 Rationale for revision of grade type:

**8. Proposed term for implementation:**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | October 21, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

Proposal Date: November 19, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Create a New Course**

**(Action Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1.** **Identification of proposed course:**

* 1. Course prefix (subject area) and number: CS 351
  2. Course title: Database Management Systems I
  3. Abbreviated course title: Database Mgt Systems I
  4. Credit hours: 3 Variable credit (yes or **no**)
  5. Grade type: standard letter grade
  6. Prerequisites/corequisites:

CS 221 with a grade of "C" or better

* 1. Course description:

An introduction to relational database management systems and their applications. Topics include relational model, relational algebra, SQL, indexes, security, integrity rules, effective database design methods, and database applications.

**2. Rationale:**

* 1. Reason for developing the proposed course:

This course will replace CS 251 Introduction to Database Systems. The new upper level course number is consistent with the ongoing restructuring of the computer science undergraduate program. Also, the majority of students taking CS 251 (90% in Spring 2014) have at least junior status.

* 1. Projected enrollment in the proposed course:

The estimated demand for this course is one section of 20-40 students per year, based on previous demand for CS 251.

* 1. Relationship of the proposed course to courses now offered by the department:

CS 351 will provide the foundation for students taking CS 443 (Database Management Systems II), which covers many theoretical topics, such as relational algebra, transaction management, consistency maintenance and database recovery.

* 1. Relationship of the proposed course to courses offered in other departments:

CIT offers Database Administration I (CIT 350) and Database Administration II (CIT 352). They focus on database applications for business use. Geography/Geology offers GEOG 443 GIS Databases. This course focuses on the ESRI Geodatabase model in ArcGIS desktop software along with spatial database engines used with database management systems software.

* 1. Relationship of the proposed course to courses offered in other institutions:

The Computer Science program at Western Kentucky University will follow the same accreditation standards and model curriculum guidelines as other Computer Science programs in the U.S. Eastern Kentucky University offers Database Systems (CSC 313), Ball State University offers Database Design (CS 346), and Appalachian State University offers Introduction to Database Systems (CS 3430).

**3. Discussion of proposed course:**

* 1. Schedule type:

L

* 1. Learning Outcomes:
* Understand the role of a database management system in an organization.
* Understand basic database concepts, including the structure and operation of the relational data model.
* Understand and apply basic database design principles, including E-R diagrams and database normalization.
* Construct database queries using Structured Query Language (SQL).
* Apply database programming techniques in problem solving.
* Understand database security and administration.
  1. Content outline:
* Database approach concepts and database environment
* The relational data model and constraints
* Relational algebra
* Entity-Relationship (E-R) modeling
* Normalization
* Structured Query Language and database programming techniques
* Database security and administration
  1. Student expectations and requirements:

Course grades will be determined by student performance on class activities, projects, assignments and examinations.

* 1. Tentative texts and course materials:

Concepts of Database Management, 7th Edition, Philip J. Pratt/Joseph J. Adamski, ISBN-10: 1111825912, ISBN-13: 9781111825911

**4. Resources:**

* 1. Library resources: Present library holdings are sufficient.
  2. Computer resources: University computing resources are sufficient.

**5. Budget implications:**

* 1. Proposed method of staffing: The present number of computer science faculty is sufficient.
  2. Special equipment needed: None
  3. Expendable materials needed: None
  4. Laboratory materials needed: None

**6. Proposed term for implementation:**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | November 20, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

Proposal Date: October 4, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Revise A Program**

**(Action Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1. Identification of program:**

* 1. Current program reference number:

629P (seeking admission)

629 (officially admitted)

* 1. Current program title:

Major in Computer Science

* 1. Credit hours: 44-50

**2. Identification of the proposed program changes:**

* Change the course numbers for CS 181, CS 280, and CS 380
* Replace CS 251 with CS 351.

**3. Detailed program description:**

|  |  |
| --- | --- |
| The major in computer science requires a minimum of 44 semester hours. To be admitted to the computer science major, students must complete CS 180, ~~181~~, and CS ~~280~~ with grades of C or better. In addition, all CS courses counting toward the CS program major must be completed with a grade of “C” or better. Computer Science electives  may include from 0-6 hours of 200-level courses. Students must adhere to all University Policies as indicated in the WKU catalog section “Academic Information.” Additional requirements are as follows: | The major in computer science requires a minimum of 44 semester hours. To be admitted to the computer science major, students must complete CS 180, **221**, and CS **338** with grades of C or better. In addition, all CS courses counting toward the CS program major must be completed with a grade of “C” or better. Computer Science electives may include from 0-6 hours of 200-level courses. Students must adhere to all University Policies as indicated in the WKU catalog section “Academic Information.” Additional requirements are as follows: |
| Systems/Scientific Applications Concentration  1. 50 hours are required including 47 hours of computer science courses and 3 hours of STAT 301.  2. ENG 307, MATH 136, and PHIL 215 are required.  3. Completion of these 11 CS core courses (35 credit hours): CS 180, ~~181~~, ~~251~~, ~~280~~, 325, 360, ~~380~~, 382, 396, 425, and 496.  4. Completion of 12 hours of CS electives from the following courses: CS 370, 381, 443, 445, 446, 450, and 456.  5. Completion of 2 courses from the following list: MATH 127, 137, 305, 307, 331, 405, 406, 470 and 473.  6. Completion of one year of a laboratory science (a two semester sequence of the same science) and one additional science course. All must be designed for Science/Engineering majors.  7. One additional course from the above list of ~~MATH~~ courses (this course may not be used to satisfy any other CS major degree requirement) or one additional science course designed for science/engineering majors. | Systems/Scientific Applications Concentration  1. 50 hours are required including 47 hours of computer science courses and 3 hours of STAT 301.  2. ENG 307, MATH 136, and PHIL 215 are required.  3. Completion of these 11 CS core courses (35 credit hours): CS 180, **221**, **338,** 325, **351,** 360, 382, 396, **421**, 425, and 496.  4. Completion of 12 hours of CS electives from the following courses: CS 370, 381, 443, 445, 446, 450, and 456.  5. Completion of 2 courses from the following list: MATH 127, 137, 305, 307, 331, 405, 406, 470 and 473.  6. Completion of one year of a laboratory science (a two semester sequence of the same science) and one additional science course. All must be designed for Science/Engineering majors.  7. One additional course from the above list of **Mathematics** courses (this course may not be used to satisfy any other CS major degree requirement) or one additional science course designed for science/engineering majors. |
| Any Minor Option  1. 44 hours of computer science courses are required.  2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.  3. Completion of these 11 CS core courses (35 credit hours): CS 180, ~~181~~, ~~251~~, ~~280~~, 325, 360, ~~380~~, 382, 396, 425, and 496.  4. Completion of an additional 9 hours of CS electives at the 200-level or above (excluding CS 226 and 257) including 3 hours at the 400-level and another 3 hours at the 300-level or higher. Note: At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major.  5. Completion of any additional minor/major. | Any Minor Option  1. 44 hours of computer science courses are required.  2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.  3. Completion of these 11 CS core courses (35 credit hours): CS 180, **221**, **338,** 325, **351,** 360, 382, 396, **421**, 425, and 496.  4. Completion of an additional 9 hours of CS electives at the 200-level or above (excluding CS 226 and 257) including 3 hours at the 400-level and another 3 hours at the 300-level or higher. Note: At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major.  5. Completion of any additional minor/major. |
| Specialty Concentration  50 hours of computer science courses are required.  1. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.  2. Completion of these 13 CS core courses (41 credit hours): CS 180, ~~181~~, ~~251~~, ~~280~~, 325, 360, ~~380~~, 381, 382, 396, 425, 443, and 496.  3. An additional 18 hours of specialty courses, selected in consultation with a CS advisor, not used to satisfy specific other graduation requirements for the CS major or for the Colonnade Program, including 9 hours of which are at the 300 level or above.  4. Completion of an additional 9 hours of CS electives at the 200-level or above (excluding CS 226 and 257) including 3 hours at the 400-level and another 3 hours at the 300-level or higher. Note: At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major. | Specialty Concentration  1. 50 hours of computer science courses are required.  2. ENG 307, MATH 136, STAT 301, and PHIL 215 are required.  3. Completion of these 13 CS core courses (41 credit hours): CS 180, **221**, **338**, 325, **351**, 360, 381, 382, 396, **421**, 425, 443, and 496.  4. An additional 18 hours of specialty courses, selected in consultation with a CS advisor, not used to satisfy specific other graduation requirements for the CS major or for the Colonnade Program, including 9 hours of which are at the 300 level or above.  5. Completion of an additional 9 hours of CS electives at the 200 level or above (excluding CS 226 and 257) including 3 hours at the 400 level and another 3 hours at the 300 level or higher. Note: At most 1.5 hours of credit for CS 239 may count towards the major. At most 3 hours of credit for CS 239 and 245 (only for languages for which credit is not received through another course) may count towards the major. |

**4. Rationale for the proposed program change:**

The program revision reflects replacing CS 251 with CS 351 and the renumbering of CS 181 as CS 221, CS 280 as CS 338, and CS 380 as CS 421.

**5. Proposed term for implementation and special provisions (if applicable):**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | October 21, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

Proposal Date: October 4, 2014

**Ogden College of Science and Engineering**

**Department of Computer Science**

**Proposal to Revise A Program**

**(Action Item)**

Contact Person: Huanjing Wang, [huanjing.wang@wku.edu](mailto:huanjing.wang@wku.edu), 745-2672

**1. Identification of program:**

* 1. Current program reference number: 341
  2. Current program title: Minor in Computer Science
  3. Credit hours: 23

**2. Identification of the proposed program changes:**

* Change the course numbers for CS 181 and CS 280
* Replace CS 251 with CS 351
* Delete the additional requirements
* Change number of credit hours from 23 to 20

**3. Detailed program description:**

|  |  |
| --- | --- |
| ~~The following 23 credit-hour program leads to a minor in computer science.~~ All CS courses counting toward the CS program minor must be completed with a grade of “C” or better:  1. Completion of the following 11 credit hours: ~~CS 180, 181, and 251 or 280~~.  2. ~~Completion of at least 12 hours of CS courses at the 300-level or higher.~~  3. ~~Completion of: MATH 119 or MATH 136, and PHIL 215.~~ | **The following 20 credit-hour program leads to a minor in computer science.** All CS courses counting toward the CS program minor must be completed with a grade of “C” or better.  **1. Completion of the following two required courses (8 hours):**  **CS 180 and CS 221**  **2. Completion of the one of the following**  **courses (3 hours):**  **CS 338 or CS 351**  3. **Completion of 9 additional hours of CS courses at the 300-level or higher.** |

**4. Rationale for the proposed program change:**

The revision of the program is consistent with replacing CS 251 with CS 351 and with renumbering CS 181 as CS 221 and CS 280 as CS 338. To encourage more students to pursue the CS minor, the minimum requirements has been reduced to 20 hours. At University of Kentucky, the minor in Computer Science requires a minimum of 20 hours of course work in CS; at the University of Alabama minor in Computer Science requires a minimum of 18 hours of course work in CS; at Miami University minor in Computer Science requires a minimum of 18 hours of course work in CS.

**5. Proposed term for implementation and special provisions (if applicable):**

Fall 2015

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

|  |  |
| --- | --- |
| Department of Computer Science | October 21, 2014 |
| Ogden College Curriculum Committee | December 4, 2014 |
| Undergraduate Curriculum Committee |  |
| University Senate |  |

**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. Course prefix and number: **PHYS 425**
  2. Course title: **Physics of Materials Science**
  3. Abbreviated course title: **Phys Mat Sci**
  4. Credit hours and contact hours: **3**
  5. Type of course: **C**
  6. Prerequisite(s): **PHYS321, MATH 237**
  7. Corequisite(s): **PHYS440, MATH 331**
  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**:

* 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.
  2. **Projected enrollment in the proposed course**: 6-8 students per offering based on previous enrollment in Solid-State Physics course.
  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.
  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.
  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**:

* 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.
  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
  1. **Student expectations and requirements**:

Performance will be evaluated based upon examinations, classroom discussion, field trips, and term paper presentation.

* 1. *Materials Science and Engineering: An Introduction* by William D. Callister Jr. and David G. Rethwisch, 9th 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, 7th Ed. Prentice-Hall, Upper Saddle River, New Jersey, 2008.

*Principles of Materials Science and Engineering*, William F. Smith, McGraw-Hill, Inc. 3rd Ed. New York, 1999.

**4. Resources**:

* 1. Library resources: See attached library resource form and bibliography.
  2. Computer resources: No new additional resources required.

**5. Budget implications**:

* 1. Proposed method of staffing: Existing faculty will teach this course.
  2. Special equipment needed: None
  3. Expendable materials needed: None
  4. Laboratory materials needed: None

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

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

Department of Physics & Astronomy \_\_\_\_\_March 31, 2014\_\_\_\_

Ogden College Curriculum Committee \_\_\_\_\_December 4, 2014\_\_

Undergraduate Curriculum Committee \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**Attachment**: **Bibliography, Library Resources Form**, **Course Inventory Form**