Section 001: Introduction to Materials Research using a Scanning Electron Microscope
Dr. Carl Boehlert & Dr. Per Askeland, Chemical Engineering & Materials Science
Tues. 3-3:50pm; Max 15
This seminar will introduce students to the concepts and applications of scanning electron microscopy (SEM) in modern materials-related research. After a semester of informal lecture/discussions and lab demonstrations, students will participate in a materials-based research project under the direction of the participating instructors. Scanning electron microscopy is an ideal tool for researching a wide variety of materials-related issues such as manufacturing, fracture analysis, mechanical and deformation behavior, phase transformations, etc. It is also an excellent means for introducing undergraduate science majors to the multidisciplinary nature of materials science and engineering. Students in all major scientific disciplines, including physics, chemistry, engineering, biochemistry, physiology, etc. can play a role in materials-based research. The course will conclude with the students actively involved in the design and performance of a research study under the joint direction of the participating instructors. The head instructor hopes and anticipates that some of the students will then be interested in and qualified for further participation in research in faculty’s lab during the remainder of their undergraduate careers. The students will present the results of their research at the University Undergraduate Research and Arts Forum (UURAF). The specific project will depend on the state of student’s interests at that time. However, the student project will likely focus on SEM analysis of ceramics, composites, biomaterials, metallic alloys, etc. For example:
1. Fracture Analysis as Used in Forensic Science
2. Deformation Behavior of Materials; In-Situ Deformation Observations
3. Characterization of Biomaterials
4. Physical Metallurgy
5. Environmental Scanning Electron Microscopy

Section 002: Women in STEM Disciplines at MSU
Dr. Danita Brandt, Geological Sciences
Wed. 3-3:50pm; Max 12
Participants will use archival sources (University Archives, MSU Libraries) and current, web-based resources to research the status of women in STEM disciplines at MSU, at all levels (undergraduate, graduate, research associate, faculty). Participants will be mentored in the research process from project conception, through writing a research proposal and budget, gathering and graphically representing their data, interpreting their results, and understanding the broader impacts of their work. The seminar will feature interactions with female STEM faculty and students and will culminate with presentations at UURAF.

Section 003: Stock Portfolio Risk Diversification: Myth or Reality?
Dr. Kirt Butler & Dr. Antoinette Tessmer, Finance
Fri 9:10-10am; Max 15
Stock portfolio risk diversification: myth or reality? Do you consider yourself a risk-averse investor? Or do you better describe yourself as a risk-lover stock trader? This seminar gives the opportunity to test yourself with a $1M stock portfolio to be invested on the stock market. The seminar will discuss risk definitions and measurements when related to stock investment. Using The Wall Street Journal as our official reference for current financial news, we will track the effects of company and market news on portfolio risk. You will be responsible for investing your wealth while carefully controlling the risk level of your portfolio. Various risk management methods will be selected and tested. Time will tell if your method is efficient at reducing risk. Which method performs best and why? Those are the questions this seminar will attempt to answer.

Section 004: Molecular Phylogenetics and Evolution
Dr. Patrick Edger, Horticulture
Thurs. 4:30-6pm; Max 12
Our understanding of evolution has been revolutionized by the ability to study the processes of genetic change at the molecular level. This seminar course will cover the mathematical, computational and molecular techniques required to explore the evolutionary diversity of the planet’s molecular (DNA) sequences and estimate the evolutionary relationships among species. This course will introduce students to tree thinking – how to correctly interpret phylogenetic trees. Phylogenetic trees serve as a powerful framework to estimate the timing of divergence events, analyze geographic distribution of species, and investigate the origin of evolutionary novelties. In addition, this course will provide students the opportunity to gain valuable hands-on experience with generating and analyzing their own data. Students will also be provided an opportunity to publish
their research (as part of a larger class project) in a peer reviewed journal, and present their research at the University Undergraduate Research and Arts Forum.

Section 005: From Atomic Nuclei to Stars: Research at the National Superconducting Cyclotron Lab
Dr. Heiko Hergert, Physics & Faculty Colleagues at NSCL
Thurs. 3-4:20pm; Max 10
For more than 50 years, scientists from MSU and all over the world have been conducting nuclear physics research at the National Superconducting Cyclotron Laboratory (NSCL), producing and studying the properties of exotic nuclei, discovering new phenomena and creating new theoretical models to explain and predict nuclear characteristics. The same exotic nuclei are also participating in stellar events, defining the energetics of supernova explosions and guiding the synthesis of the elements we see around us. In this Honors Research Seminar students will learn about some of the exciting research projects that faculty at NSCL are working on, and they will join a research group to get hands-on experience in areas at the forefront of experimental or theoretical nuclear science. **Note:** Regular meeting times will occur during the first 4 weeks and end of the seminar. Otherwise, hours will be arranged between students and their faculty mentor for regular, weekly work.

Section 006: Pay More Attention to the Justices Behind the Curtain
Dr. Ryan Black, Political Science
Mon. 5:20-6:10; Max 15
The Supreme Court is the most secretive of the three branches of government and the votes justices cast occur in complete privacy during weekly conference meetings. How do Supreme Court justices make decisions and set policy on the nation’s most important legal issues? How does the conference meeting influence how a case proceeds? The purpose of this seminar is to gather information on Supreme Court justices’ conference notes to answer these questions. No background in law or political science is necessary. All UGS 200H seminars have a Fall enrollment but work will continue into the Spring with expected participation in the University Undergraduate Research Forum (UURAF) in April.

Section 007: Researching and Designing Inclusive Public Art Projects: A Collaboration with Impression 5 Science Museum
Dr. Nancy DeJoy, Writing, Rhetoric & American Cultures
 Tues. 3-4:20pm; Max 15
This seminar will involve students in the study and design of collaborative public art projects that have inclusion of diverse participants as a major goal. The course will involve students in a project with Impression 5 Science Center and other businesses on Museum Drive in Lansing. Students will read scholarship and case studies about inclusive public art projects, focusing specifically on materials related to working with museums to design public art projects that are inclusive and that enhance community members’ perceptions of the neighborhood as welcoming to diverse populations. Students will learn how to do community-based research for the purpose of designing inclusive community-based public art projects, and collaborate with Impression 5 personnel and other interested neighbors on Museum Drive to design a public art project for Museum Drive in Lansing. Students will also study the rhetoric of announcing and public relations for public art projects that aim for inclusivity and will design materials for advertising the call for submissions for the project.

Section 008: Theatre & Game Narratives: Researching New Methods of Audience Interaction in Live Performance
Dr. Alison Dobbins & Mr. Brad Willcuts, Theatre; Dr. Alexis Bacon, Music;
 Tues. 3-4:20pm; Max 10
Seminar will cover key concepts at the forefront of digital theatre: combining narrative principles of game design, theatre and film. Students will be introduced to a variety of audience interaction methods currently being used in the field. The goal of this seminar is to equip students with the skills to integrate an artistic and analytic approach to solving problems contributing to an audience-interactive musical, *Jaws: The Musical.*

Section 009: The Form and Function of Vocal Communication in Animals
Dr. Kay Holekamp & Ms. Kenna Lehmann, Integrative Biology
Wed. 3-4:20pm; Max 9
Many animals rely heavily on vocal communication to successfully navigate their social interactions. Spotted or “laughing” hyenas live in large social groups and have a rich vocal repertoire that remains largely unstudied. This seminar will guide students through the development, design, implementation, and presentation of a scientific study on the form and function of
Spotted hyena calls. Students will learn how the theory of animal communication can be utilized to assess particular communication strategies and decisions made in the lives of wild animals. Students will receive explicit instruction in our laboratory on how to test functional hypotheses and how to use sound analysis and statistical software, including Raven, R, and MATLAB.

**Section 010: Examining Coupled Human and Natural Systems to Address Complex Environmental Issues**

Dr. Steven Safferman & Steve Marquie, Biosystems and Agricultural Engineering; & Dr. Georgia Peterson, Forestry

Wed. 3-4:20; Max 9

Students will learn to recognize, model and analyze coupled human and natural systems (CHANS) in various scales and contexts. Understanding the mechanisms behind systems, and working across disciplinary specialties are more effective ways to address current, complex environmental issues. Students will apply CHANS concepts to a self-selected project and produce a project report.

**Section 011: Using fMRI to Link Brain Network Activity with Human Task Performance**

Dr. Jie Huang, Radiology

Fri. 3-4:20pm; Max 6

The activity of brain neural networks gives rise to simple motor behaviors as well as complex behaviors. To understand how the network activity is transformed into human behaviors, it is necessary to identify task-specific networks and analyze the dynamic network activity that changes with time. This research seminar will guide students in learning the fundamental principals involved in functional magnetic resonance imaging (fMRI) and the software used to analyze fMRI data. The goal of the project is to allow a team of six students to design and implement a finger-tapping fMRI experiment to identify the finger-tapping-associated network and analyze the dynamic network activity, aiming to link the network activity with the task performance.

**Section 012: The Sands of Mars and The Assessment of Potential Habitability**

Dr. Michael A. Velbel, Geological Sciences

Tu & Th 4:10-5pm; Max 15

The scientific search for evidence of past or present life on Mars is based on the search for evidence of liquid water, and evidence for the physical state and chemical composition of that water. Much evidence for the state and composition of past water is preserved in the minerals that may have reacted with past, no-longer-extant, water. To improve interpretation of the environmental significance of the coarsest grains imaged using the Phoenix Optical Microscope, student participants in this seminar will examine the shapes and surface textures of sand grains in instrumentally acquired images of sand from the Phoenix Mars Lander landing site on Mars and compare their attributes with those of similar grains from well-studied terrestrial (mostly basaltic) analogs. Beginning with visual and simple quantitative classification methods used by geologists to characterize and describe sediment-grain shapes and surface textures, student participants will examine a variety of grain types in representative mission and analog-sample images and make preliminary assessments of the alteration, transport and deposition/accumulation histories of the sands.

**Section 013: History and Testimony in the Digital Age: Studying the Holocaust**

Dr. Steven Weiland, Educational Administration & Faculty Colleagues in the Jewish Studies Program

Thurs. 2-3:20pm; Max 15

This Honors College Seminar will offer participants an opportunity for work in a unique digital resource for studying the Holocaust. They will have access to the extraordinary USC Shoah Visual History Archive via the MSU Library. Working individually and in small groups with MSU faculty from several departments, and meeting periodically in the seminar format, students will explore these questions: 1) What can be learned about the Holocaust from the perspective of those who survived to tell their stories? 2) What are the best methods for learning from testimony as a form of historical evidence? And 3) How can the evidence of testimony best be incorporated into Holocaust research and presented, including the uses of digital resources? The focus will be on capitalizing on digital resources in doing research in a domain of inquiry with profound historical and personal meanings. And students can learn about the uses of digital multi-media presentations in their academic work beyond the Seminar itself. The results of student research projects will be presented at campus and public programs.
Section 014: Local and Global: County-by-County Responses to Trade Shocks  
Dr. Michael Olabisi, Agricultural, Food & Resource Economics  
Thurs. 8:30-9:50; Max 7  
This seminar will introduce students to foundational concepts of international trade relationships and the impacts of U.S. linkages to the global economy. Students will learn about the intended and unintended consequences of trade policies and the role of the various governments and institutions in creating or undermining stability of local economies within the United States. The seminar has two goals: First, by focusing on the relationship between policy and demand shocks – surprise events that dramatically alter demand for goods or services – the seminar will illustrate the relationship between trade policy and its economic consequences. Second, by focusing on local economies, the seminar will explore how trade contributes to the economic shocks experienced by the areas that produce historically under-represented student populations – minority-majority areas, as well as agricultural communities.

Section 015: Computer-Games for STEM Education  
Dr. Gerd Kortmeyer, Physics & Astronomy  
Monday 3-4:20pm; Max 16  
Participants will learn the basics of video game programming using the Unity 3D platform in order to create "serious" games with a strong science, technology, engineering, or math background. No previous experience in computer programming is required. Participants will develop the modeling, programming, and mathematical skills required to develop 3D-video games on standard platforms, assess motivational and engagement factors of game design, explore how game play can be used for learning (along with common pitfalls of educational game design), collaborate on game design and implementation using a model project, and explore virtual reality as a medium for gaming and visualization. Development venues may include the MSU Abrams Planetarium. Research into user interactions with games will be conducted following established methods, and participants will learn how to submit protocols to Institutional Review Boards (IRBs). Games and associated research will be published, and a game parlor will be offered at the UURAF.

Section 016: Virtual Reality & Media Technology  
Dr. Taiwoo Park, Media & Information  
Wed 4:10-5pm; Max 10  
This seminar is to introduce virtual and augmented reality technology and its application areas creating academic and practical significances recently, as well as the latest advances in interactive computing technologies and application examples. Topics that may be covered are including but not limited to: basics of virtual reality and advanced mobile/ubiquitous interaction technology, interactive 360 VR film, persuasive media, rehabilitation, mental health, exercise and fitness, and use of VR technology for human behavior analysis with eye and body position tracking. Students will be given hands-on experiences via iVerse lab (immersive virtual reality experience research lab led by Dr. Taiwoo Park), by existing VR applications as well as in-house developed VR research software platform. During and after the first semester, students will participate in research and creative projects, topics of which will depend on students' interest and background, under the guidance of the instructor. The students are expected to present their work at the University Undergraduate Research and Arts Forum (UURAF).