

|   | Monday  | Tuesday  | Wednesday   | Thursday  | Friday   |
|---|---|--|---|---|--|
| 9:00 AM   | Overview and Tour of Discovery Park: Participants will receive general information for the week's activities along with a tour of the facilities and labs available.  | Demonstration: Various 3D Printing technologies across multiple medias and capacities.   | Capstone Continuation: Additional time to work on Rube Goldberg Machines and/or Cardboard City construction.  | Additive Manufacturing: Hands-on activities for non-3D printing, additive manufacturing techniques. Participants will create souvenirs using plastic injection molding and sand-casting. This activity will take place in 2 groups that rotate to the other activity after lunch. | Capstone Set-Up: Pre-lunch party activities will include the finalization of week-long competitive projects like the Rube Goldberg Machines. The cardboard city will be placed in preparation for its inevitable bombardment.  |
| 10:00 AM  | Get to Know Each Other: Ice-breaking activities to get the participants acquainted with one another in both small groups and camp-wide.   | Intro CAD: Introduction to computer-aided drafting using both a simple browser based tool and SolidWorks. Participants will draft (or import and modify) their own design for 3D printing.   | Fundamentals of Alternate Energy: Participants will participate in a guided discussion about the fundamentals of energy sources from an engineering perspective.  |   |  |
| 11:00 AM  |   |  |   |   |  |
| 12:00 PM  | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill.  |  |   |   | Lunch: Pizza party for capstone activities.  |
| 1:00 PM   | Introduction to Simple Machines using K-Nex: Fundamental engineering structures and concepts will be explored through discussion and K'Nex. Start of ongoing Rube Goldberg Machine competition between participants.  | Cardboard City: Participants will construct various structures using cardboard cutouts that will be used during capstone activities. Fundamentals of energy conservation and force will be discussed as they pertain to parabolic paths and projectiles. Participants will want to consider methods of reinforcing their structures within defined parameters. | Demonstrations in Energy Generation: Participants will set-up several alternative energy generating platforms including a wind turbine and solar-cell. They will measure the power generated across several variations. **NOTE: Activity is weather-dependant and could be replaced with an alternate if necessary.** | Additive Manufacturing: Hands-on activities for non-3D printing, additive manufacturing techniques. Participants will create souvenirs using plastic injection molding and sand-casting. This activity will take place in 2 groups that rotate to the other activity after lunch. |  |
| 2:00 PM   |   |  |   |   |  |
| 3:00 PM   | Experiment in Fundamentals of Uncertainty and Tolerance: Participants will use basic measuring tools of varying precisions to calculate density of known materials. Discussion will include introductions to uncertainty calculation and how it affects manufacturing tolerances. | Experiment in Temperature Sensor Construction and Calibration using Viscosity Measurement: Participants will construct thermocouples and learn how to calibrate them. The thermocouples will then be used to measure the temperature of a fluid and create a temperature vs. viscosity chart.  | Capstone Continuation: Additional time to work on Rube Goldberg Machines and/or Cardboard City construction.  | Capstone Continuation: Additional time to work on Rube Goldberg Machines and/or Cardboard City construction.  | Capstone Activities (Parents/Guardians encouraged to attend): Participants will be judged for the simple-complexity and goal-achieving ability of their Rube Goldberg machines. Afterward, students will bombard their cardboard city in a competitive scoring process. Placement certificates and prizes awarded in both Capstone competitions. |
| 4:00 PM   |   |  |   |   |  |
| Various Demonstrations within lab settings will occur during the week. These activities will depend upon the professors and graduate students available at that time of summer and could vary from session to session. Participants may also be tasked with constructing their own catapults and trebuchets in small groups for their capstone seige of the Cardboard City. |   |  |   |   |  |

|          | <h1>Monday</h1>   | Instructor and helper | Location/Room            | Need computer?                     | resource/Equipment                | Materials-Consumable<br>(buy annually) |
|----------|---|-----------------------|--------------------------|------------------------------------|-----------------------------------|--|
| 9:00 AM  | Overview and Tour of Discovery Park: Participants will receive general information for the week's activities along with a tour of the facilities and labs available.  | Dr. Smith/Li/ Staff   | ME conference room F102D |                                    |                                   | no                                     |
| 10:00 AM | Get to Know Each Other: Ice-breaking activities to get the participants acquainted with one another in both small groups and camp-wide. Students introduce themselves   | Dr. Smith/Li/ Staff   | ME conference room F102D |                                    | brick party                       | brick party                            |
| 11:00 AM |   |                       |                          |                                    |                                   |  |
| 12:00 PM | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill. F102D  |                       |                          |                                    |                                   |  |
| 1:00 PM  | Disciplines of Engineering: Students will learn about the different disciplines of engineering and what makes engineering a profession  | Dr. Smith/Li/ Staff   | ME conference room F102D | Yes F102D:<br>Laptop and projector |                                   |  |
| 2:00 PM  | Engineering statics: Students will learn basic understanding of physics in used in the creation of structures. Learn to use engineering ethics to understand the impact of engineering on the world. Students will begin construction on their own balsa wood bridges | Dr. Smith/Li/ Staff   | ME conference room F102D | Yes F102D:<br>Laptop and projector |                                   |  |
| 3:00 PM  | Students will begin construction on their own balsa wood bridges  | Dr. Smith/Li/ Staff   | Senior design room       |                                    | balsa wood, wood glue, hoppy saws | balsa wood, wood glue                  |
| 4:00 PM  |   |                       |                          |                                    |                                   |  |

|          | <h1>Tuesday</h1>   | Instructor and helper | Location/Room      | Need computer?                  | resource/Equipment          | Materials  |
|----------|--|-----------------------|--------------------|---------------------------------|-----------------------------|------------|
| 9:00 AM  | Demonstration: Various 3D Printing technologies across multiple medias and capacities.   | Dr. Smith/Li/ Staff   | Senior Design room | yes                             |                             | PPT Slides |
| 10:00 AM | Intro CAD: Introduction to computer-aided drafting using both a simple browser based tool and SolidWorks. Participants will draft (or import and modify) their own design for 3D printing. Tinkercad | Dr. Smith/Li/ Staff   | F187               | Yes                             |                             |            |
| 11:00 AM |  |                       |                    |                                 |                             |            |
| 12:00 PM | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill. F102D   |                       |                    |                                 |                             |            |
| 1:00 PM  | Demonstration of Pettinger Center engine collection.   | Dr. Smith/Li/ Staff   | Senior Design room | No                              |                             |            |
| 2:00 PM  | Engineering Dynamics: Students will learn about dynamics which is used in the design and creation of mechanical systems.   | Dr. Smith/Li/ Staff   | ME conference room | Yes F102D: Laptop and projector | F102D: Laptop and projector | PPT        |
| 3:00 PM  | Build with Knex to fabricate mechanical systems.   | Dr. Smith/Li/ Staff   | Senior Design room | No                              | Knex                        | Knex       |
| 4:00 PM  | Free Build Time students can build any project they wish at this time  | Dr. Smith/Li/ Staff   | Senior Design room | No                              |                             |            |

|          | Wednesday  | Instructor and helper | Location/Room              | Need computer?                  | resource/Equipment          | Materials                    |
|----------|--|-----------------------|----------------------------|---------------------------------|-----------------------------|------------------------------|
| 9:00 AM  | Engineering Manufacturing: creating mold of 3d printed item  | Dr. Smith/Li/ Staff   | Senior Design room         |                                 | silicone resin              | Silicon resin and mold frame |
| 10:00 AM |  |                       |                            |                                 |                             |                              |
| 11:00 AM | Fundamentals of Alternate Energy: Participants will participate in a guided discussion about the fundamentals of energy sources from an engineering perspective. | Dr. Smith/Li/ Staff   | Senior Design room         |                                 |                             |                              |
| 12:00 PM | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill. F102D   |                       |                            |                                 |                             |                              |
| 1:00 PM  | Tour ZOE Lab and explain concepts and technologies used in the lab   | Dr. Smith/Li/ Staff   | Senior Design room/ZOE Lab |                                 |                             |                              |
| 2:00 PM  | Engineering Ethics Lecture   | Dr. Smith/Li/ Staff   | ME conference room         | Yes F102D: Laptop and projector | F102D: Laptop and projector | PPT                          |
| 3:00 PM  | Free Build Time students can build any project they wish at this time.   | Dr. Smith/Li/ Staff   | Senior Design room         |                                 |                             |                              |
| 4:00 PM  |  |                       |                            |                                 |                             |                              |

|          | Thursday  | Instructor and helper | Location/Room      | Need computer? | resource/Equipment | Materials              |
|----------|---|-----------------------|--------------------|----------------|--------------------|------------------------|
| 9:00 AM  | Engineering Manufacturing: Pouring resin into molds to make replicate parts                               | Dr. Smith/Li/ Staff   | Senior Design room |                |                    | resin                  |
| 10:00 AM | Engineering Decision Matrix   | Dr. Smith/Li/ Staff   | ME conference room | yes            |                    | copies of matrix sheet |
| 11:00 AM |   |                       |                    |                |                    |                        |
| 12:00 PM | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill. F102D  |                       |                    |                |                    |                        |
| 1:00 PM  | Engineering Design Lecutre: show how mechanical engineering is used in every step of design of an object. | Dr. Smith/Li/ Staff   | ME conference room | yes            |                    |                        |
| 2:00 PM  | Students will construct card board gliders using elmers build it kits                                     | Dr. Smith/Li/ Staff   | Senior Design room |                |                    | Elmers build it        |
| 3:00 PM  |   |                       |                    |                |                    |                        |
| 4:00 PM  | Build Time: Students can continue working on project  | Dr. Smith/Li/ Staff   | Senior Design room |                |                    |                        |

|          | <h1>Friday</h1>  | Instructor and helper | Location/Room      | Need computer? | resource/Equipment | Materials |
|----------|--|-----------------------|--------------------|----------------|--------------------|-----------|
| 9:00 AM  | Engineering Manufacturing: students will demold their part replicas from their molds   | Dr. Smith/Li/ Staff   | Senior design room |                |                    |           |
| 10:00 AM | card board gliders: Students will complete their cardboard gliders and they will be launched to see how far they go.   | Dr. Smith/Li/ Staff   | TBD                |                |                    |           |
| 11:00 AM |  |                       |                    |                |                    |           |
| 12:00 PM | Lunch: Participants will be provided a lunch of their choice from the on-site food-services grill. F102D   |                       |                    |                |                    |           |
| 1:00 PM  | build Activities: Students will continue to work on their construction projects. At 2 Parents/Guardians encouraged to attend to see what their campers learned this week and speak with camp staff | Dr. Smith/Li/ Staff   | Senior design room |                |                    |           |
| 2:00 PM  |  |                       |                    |                |                    |           |
| 3:00 PM  |  |                       |                    |                |                    |           |
| 4:00 PM  | Camp clean up.   | Dr. Smith/Li/ Staff   | Senior design room |                |                    |           |