Background

Traffic operations involves the planning, monitoring, evaluation, and improvement of transportation facility performance through the application of technology and the use of scientific, engineering and economic principles. Facility performance measures include safety, efficiency, comfort, convenience, and environmental compatibility for all highway users. Operations are important during the design phases of a project from the standpoint of predicting future facility performance and selecting necessary traffic controls. Operations remain important after a facility is built through continued facility monitoring, evaluation, problem identification, and improvement.

Operations are an increasingly important issue as many areas of the U.S. are no longer able to build new or reconstruct existing facilities. This course is intended to expand upon the principles of traffic operations contained in CE 321. The course is designed to provide students with many important theories and techniques of traffic operations. There is also an applied component which is evident in the many field data collection experiences from the laboratory portion of the course.

Educational Objectives

1. Prepare for a professional career in transportation engineering by demonstrating knowledge of traffic operations concepts and principles.
2. Experience application of traffic operations methods in actual field-based laboratory exercises.
3. Demonstrate knowledge of the application of data collection techniques by conducting analyses with data from both homework assignments and field exercises. Integrate findings from all field exercises into an interim progress report and final report of project findings.
4. Gain experience in making professional presentations by twice presenting the findings of the field exercises to your instructors and peers.
5. Develop skills to be able to conduct signal timing studies with the latest in computer analysis software (Highway Capacity Software and Synchro).

Class overview

Student evaluation is based upon periodic assignments, a mid-term exam, a final exam, and a series of laboratory exercises. Assignments based on lecture material will be provided by the course instructor during lecture. Students will be given adequate time to complete the assignments. Additionally, there will be several laboratory exercises requiring students to collect data at locations in the Borough of State College. The purpose of these exercises is to apply the traffic operations principles learned during the lecture portion of the course. Students will be expected to use both manual observation methods and automated equipment to complete laboratory exercises – each field exercise will be discussed in the laboratory prior to collecting data in the field. Because of the complexity of many field assignments, students will be expected to work in teams of three to complete the necessary data collection and analysis.

Rather than require weekly deliverables based on the field exercises, teams will provide two submissions during the semester summarizing their results. One submission will be at the mid-point of the semester and the final submission will be during the last week of classes. Specific due dates for project deliverables will be provided.
by the laboratory instructor. Project teams will be assigned study locations each week by the laboratory instructor. It is expected that all field exercise deliverables will contain an evaluation of the existing conditions at the assigned locations and an analysis of any proposed recommendations to improve traffic operations at these locations. Students will be expected to provide an overview of each study site location (using both narrative and graphical methods), a summary of each exercise with a summary of data in tabular form, results of all analyses, and traffic operations improvements recommended as a result of the field studies. Analytical support for the recommended improvements must also be provided in the final deliverable. Each team will make two presentations during the semester. The first will be a progress report meeting at the time when the first team deliverable is due. The second presentation will be a summary of findings during the last week of classes. More details regarding project deliverables will be provided weekly during the laboratory.

**Grading:**

- Mid-term Exam = 15%
- Final Exam = 15%
- Homework Assignments = 15%
- Laboratory Submittal I = 15%
- Progress Report Presentation = 10%
- Laboratory Submittal II = 20%
- Final Presentation = 10%

100%

**Lecture Hours:**

- **TR** 1:325–2:15 PM Sec 1 207 Thomas Building

**Laboratory:**

- **W** 12:20 – 2:15 PM Sec 1 228 Sackett Building (CAD Lab)

**Instructor and Teaching Assistant Contact Information:**

<table>
<thead>
<tr>
<th>Instructor &amp; Teaching Assistant</th>
<th>Mr. Robert Watts, P.E.</th>
<th>Daniel Kwon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office</td>
<td>406A Sackett Building</td>
<td>228 Sackett Building (CAD Lab)</td>
</tr>
<tr>
<td>Phone</td>
<td>(814) 571-4852</td>
<td>(443) 465-5281</td>
</tr>
<tr>
<td>E-mail</td>
<td><a href="mailto:rwatts@engr.psu.edu">rwatts@engr.psu.edu</a></td>
<td><a href="mailto:dwk152@psu.edu">dwk152@psu.edu</a></td>
</tr>
<tr>
<td>Office Hours</td>
<td>TR 2:30 pm – 4:00 pm 406A Sackett Building Other times by appointment</td>
<td>M 6:00 pm– 8:00 pm 228 Sackett Building (CAD Lab) Other times by appointment</td>
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Students are responsible for all reading assignments prior to class meeting times. The enclosed course schedule will serve as a general guide for the topics covered during each scheduled period; however, the schedule is subject to change at the discretion of the instructor.

There will be one night exam given during the semester, and a final exam will be administered during the regular final exam period. The course content included on all exams will be announced by the instructor during regularly scheduled class periods prior to the exam date. Students will be permitted to use their course textbook and notes for exams. Calculators will be needed for all exams.
All homework assigned during course lectures are individual efforts. These assignments will be made by the course instructor during regularly scheduled periods. All assignments will be graded and be returned as soon as possible. Adequate time will be given to complete all assignments – late coursework will not be accepted unless given approval by the course instructor prior to the due date. Be sure to clearly state all assumptions for given problems; provide orderly problem calculations; and, clearly identify solutions (include units).

Class attendance is not mandatory, but is highly recommended. Active student participation during lecture and laboratory periods is encouraged. Example problems will be completed during class so bring your course text, engineering paper, and a calculator to all scheduled class periods.

The course and laboratory instructors will use ANGEL to post course lecture and laboratory materials, and homework solutions. Other relevant course materials will also be posted on ANGEL throughout the semester as will the course schedule. Please visit the course website frequently during the semester.

**Unviersity Academic Integrity Policy:**

“Academic integrity is the pursuit of scholarly activity in an open, honest and responsible manner. Academic integrity is a basic guiding principle for all academic activity at The Pennsylvania State University, and all members of the University community are expected to act in accordance with this principle. Consistent with this expectation, the University's Code of Conduct states that all students should act with personal integrity, respect other students' dignity, rights and property, and help create and maintain an environment in which all can succeed through the fruits of their efforts.

Academic integrity includes a commitment not to engage in or tolerate acts of falsification, misrepresentation or deception. Such acts of dishonesty violate the fundamental ethical principles of the University community and compromise the worth of work completed by others.”

—From Penn State's *University Faculty Senate Policy 49-20*

**Schedule Notes:**

The University Add Period ends at 8:00 AM on September 2.

The University Late Drop Period ends November 12.
<table>
<thead>
<tr>
<th>Class #</th>
<th>Date</th>
<th>Reading</th>
<th>Lecture Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>T 8/24</td>
<td>RPM Ch. 1</td>
<td>Class introduction</td>
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<td>Introduction to Traffic Engineering</td>
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<td>2</td>
<td>W 8/25</td>
<td>RPM Ch. 2</td>
<td>Laboratory #1</td>
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<td>Road Users/Vehicles</td>
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<tr>
<td>3</td>
<td>R 8/26</td>
<td>RPM Ch. 4</td>
<td>Traffic Control Devices</td>
</tr>
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<td>4</td>
<td>T 8/31</td>
<td>RPM Ch. 5</td>
<td>Traffic Control Devices/Traffic Stream Characteristics</td>
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<td>5</td>
<td>W 9/1</td>
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<td>Site Investigation</td>
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<td>6</td>
<td>R 9/2</td>
<td>RPM Ch. 7</td>
<td>Statistical Applications in Traffic Engineering</td>
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<td>T 9/7</td>
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<td>8</td>
<td>W 9/8</td>
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<td>Intersection Turning Movement Counts</td>
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<td>9</td>
<td>R 9/9</td>
<td>RPM Ch. 8</td>
<td>Volume Studies and Characteristics</td>
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<td>10</td>
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<td>11</td>
<td>W 9/15</td>
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<td>12</td>
<td>R 9/16</td>
<td>RPM Ch. 9</td>
<td>Speed, Travel Time, and Delay Studies</td>
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<td>13</td>
<td>T 9/21</td>
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<td>14</td>
<td>W 9/22</td>
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<td>RPM Ch. 10.1-10.3</td>
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<td>16</td>
<td>T 9/28</td>
<td>Handout</td>
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<td>W 9/29</td>
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<td>Collision Diagrams</td>
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<td>R 9/30</td>
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<td>Empirical Bayes Safety Analysis</td>
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<td>19</td>
<td>T 10/5</td>
<td>RPM Ch. 12, 13</td>
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| 20     | W 10/6 |               | Laboratory #7  
HCS Applications -- Freeways                                                   |
| 21     | R 10/7 |               | Weaving/Merging/Diverging Analysis on Freeways                                 |
| 22     | T 10/12| RPM Ch. 16    | Intersection Control                                                           |
| 23     | W 10/13|               | Laboratory #8  
Mid-Semester Progress Reports                                                   |
| 24     | R 10/14| RPM Ch. 17    | Principles of Signalized Intersections                                          |
| 25     | T 10/19|               | NO CLASS – Mid-term Exam                                                       |
| 26     | W 10/20|               | Laboratory #9  
HCS Applications – Freeways and Weaving/Merge/Diverge Analysis                  |
| 27     | R 10/21| RPM Ch. 18    | Signal Timing and Design                                                       |
| 28     | T 10/26|               | Signal Timing and Design                                                       |
| 29     | W 10/27|               | Laboratory #10  
Signal Timing and Design                                                        |
| 30     | R 10/28| RPM Ch. 20    | Actuated Signal Control and Detection                                           |
| 31     | T 11/2 | RPM Ch. 21    | Signalized Intersection Analysis                                                |
| 32     | W 11/3 |               | Laboratory #11  
HCS – Signalized Intersection Analysis                                           |
| 33     | R 11/4 |               | Signalized Intersection Analysis                                                |
| 34     | T 11/9 |               | Signalized Intersection Analysis                                                |
| 35     | W 11/10|               | Laboratory #12  
Synchro/SimTraffic Analysis of Signalized Intersections                          |
| 36     | R 11/11| RPM Ch. 23    | Unsignalized Intersection Analysis                                              |
| 37     | T 11/16|               | Unsignalized Intersection Analysis                                              |
| 38     | W 11/17|               | Laboratory #13  
HCS and Synchro/SimTraffic Applications of Unsignalized Intersections           |
<p>| 39     | R 11/18| RPM Ch. 24.1 – 24.7 | Signal Coordination                                                        |
| 40     | T 11/23|               | NO CLASS – Thanksgiving Holiday                                                |</p>
<table>
<thead>
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<th>Class #</th>
<th>Date</th>
<th>Reading</th>
<th>Lecture Topic</th>
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<tr>
<td>41</td>
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<td>R 12/9</td>
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