Course Instructor:
Dr. Samir Shoukry, Professor MAE
snshoukry@mail.wvu.edu; Room 721 ESB, Phone: (304) 293-3312
Office hours: Tuesday & Thursday 11:00 AM - 12:00 AM, or by appointment via e-mail. State in your e-mail your section time and your class number in the roster.

Teaching Assistant:
Mr. Derrick Banerjee, Room 711 ESB; dbanerje@mix.wvu.edu
Office hours: Monday 2:30-4:00 PM; Tuesday 3:00-4:00 PM; Wednesday 2:30-4:00 PM; Thursday 3:00-4:00 PM

Short Description: The course provides in-depth understanding of particle and rigid-body kinematics and kinetics applied to engineering components. The topics covered are: Newtonian dynamics of particles and rigid bodies, work and energy, impulse and momentum, impact, relative motion of a system of rigid bodies in plane motion.

ABET Outcome: Graduates will have an ability to apply knowledge of mathematics, science and engineering.

Performance Indicators: 1. Use of concepts of physics in the formulation of engineering problems
2. Application of mathematics in solving engineering problems

Objective: Engineering students will learn how to apply Newton's laws to analyze and compute the motion of basic engineering components subjected to externally applied forces and moments.

Course Prerequisites: MAE241, MATH156

http://www.mypearsonstore.com/bookstore/engineering-mechanics-dynamics-0133915387

Computer Software: Mathematica and Matlab may be used to develop symbolic and numerical solutions.

Electronic Devices: Laptops, Tablets, Cell phones, Graphical and/or programmable calculators, smart watches, or any other electronic media or communication device as well as ear phones are not allowed in class or in exams and in-class quizzes. I do not allow and do not consent to recording any part of my lectures or the use of any electronic device in class including bringing the class notes on a cell phone, laptop or a tablet to ask a question.

Enforcement of Class Policies: Class policies regarding class attendance, exam schedule, quizzes and homework will be strictly enforced and applied to all students equally. **Do not request waivers because your request will be denied.**

Class Attendance:
1. Class attendance is mandatory. I will allow absence for emergencies up to four classes (~15%) for all students, after which an "F" grade is automatically assigned. The above allowance is intended to cover all emergencies that may arise during a semester as well as absences due to participation in university sanctioned events such as athletic events or conferences.
2. Late attendance to class causes unacceptable distraction to both the instructor and the students, therefore, it will not be tolerated. A student who enters a class packed with students will forces me to stop explaining and wait until he/she sits. Consider that the class starts 5 minutes before its official starting time and Do Not Enter the Class after I start at the official starting time. In-class quizzes, when given, will start at the first minute of the class; if you are late, you will not be given extra time and I may refuse to collect your HW.
3. Class presentations should be downloaded and printed from the e-campus site before attending every class. Do not print presentations in advance as I may change the content without notice.
4. Homework & Quiz assignments will be collected at the beginning of every class. As you enter the class place your stapled HW package at the assigned homework collection location.
5. Disruptive behaviour such as consuming food or drinks, reading newspapers, talking, using cell phones or other electronic devices is not permitted in class.
Home Work:

HW is assigned every class and HW reports are collected at the start of the next class. Late HW will not be accepted in general, and if accepted due to an acceptable reason other than serious illness, it will be scored at 50%. Solutions must be prepared on the homework sheets that you can print from e-Campus website. HW reports submitted on any other paper will not be accepted. Free body diagrams as well as any other diagrams should be produced using drawing tools. A short statement describing the solution approach or strategy should accompany the solution of each problem. The points awarded for your homework report depend on the overall organization and neatness of your solution presentation as well as the quality of your drawings. Homework grading rules are available on e-Campus.

Why is HW Assigned? In this class you are given access to guided as well as full solution of all HW problems. I do not use HW to test your ability to solve, but rather as solved examples to complement those explained in class, and to expose you to different ideas and solution techniques. The objective of HW is: (a) enhance your understanding of each topic, (b) teach you how to solve and present the solution of problems, and (c) prepare you to perform on quizzes and closed book exams. If you copy solutions without spending serious effort and time working out (on your own) strategy to solve the problem and implementing it to work out numerically the required answers, you will not be able to solve the quizzes or perform on closed book exams. Discipline yourself to only look at the full solution after you have exhausted all attempts to get the required answers. Once you looked at the solution do not copy it; close it and start again solving the problem on your own using your calculator to obtain the required final answers.

Weekly quizzes

Your performance on HW will be evaluated via a quiz given every week. The quizzes will be assigned and graded using Mastering Engineering. In order to ensure the integrity of the grades: (a) Unless otherwise notified, all students will start at the same time on Monday at 7:00 PM; you will be notified by e-mail of the starting and end time of every quiz. (b) the variables in each problem will be randomized, (c) other measures will be taken in order to ensure the integrity of quiz grades.

Quiz problems are similar to those assigned as HW or solved in class or listed in the textbook, therefore, I will not provide detailed solutions, however, the final answers will be shown on e-Campus. In order to be prepared for taking the quiz you need to: (a) Read the topic in the textbook and study the lecture notes, (b) solve the preliminary and fundamental problems that follow each topic and are listed on the lecture cover sheet, (c) Solve the homework problems.

Exams:

All exams are comprehensive and will be given on the following dates:

Exam I: Monday 09/17/2018 MRB 113 at 6:00 PM (15 points)
Exam II: Monday 10/22/2018 MRB 113 at 6:00 PM (20 points)
Exam III: Monday 12/03/2018 MRB 113 at 6:00 PM (30 points)

The instructor may cancel any of the above exams or replace it with one or more quizzes or increase the points of another future exam or, if the need arises, change the above exam dates and times.

Assessment:

Homework reports = 10 Points
Quizzes = 25 Points
Three Exams = 65 Points

Exam scores and grades are final and are not subject to negotiations. A student who approaches the instructor requesting a change of his/her indisputable class score/grade will be in violation of WVU code of student conduct and will be dealt with accordingly. Please note that I do not communicate exam or quiz scores by e-mail. If you have a question regarding your scores, you will have to set an appointment to see me in the office.

Final Grads:

90% or above = A; 80% to 89.9% = B; 70% to 79.9% = C; 60% – 69.9% = D; less than 60% = F

Mid Term Grade:

All students will receive a mid-term grade that will be recorded in Star on October 10/2018. This grade reflects your performance up to the date of entering the grade, but does not necessarily correlate to the final course grade that you will receive at the end of the semester. The reasons are: (a) the mid-term grade is based on only one exam worth 15 points while your final grade is based on three exams worth 65 points; (b) the material covered in the first seven weeks is the fundamental background needed for the more advanced engineering topics that are covered over the remaining part of the semester. Thus, if you receive a good mid-term grade you should be encouraged to work hard in order to perform well over the second part of the semester. On the other hand, if your mid-term grade is not the one that you have wished, you should work harder to improve your performance and achieve a good final grade.

Missing an Exam or a Quiz:

A student who misses no more than one exam due to a documented catastrophic event (1. hospitalization, 2. Accident) may be considered for a make-up; the time and form of which will be decided by the instructor. Other than that, I do not accept any excuse for missing an exam for any other reason. Excuses such as: job interview, doctor appointment, field
trip, university related business, … etc. are not acceptable on the declared exam dates listed above. If you miss any of the above scheduled exams, you lose the exam points. If you miss a quiz for any reason other than hospitalization due to a health condition or a documented accident, you will lose the points; however, I will ignore the lowest score of one quiz for all students.

**Course Syllabus:** The following are the topics that will be covered (Hibbeler 14th edition).

<table>
<thead>
<tr>
<th>Topic</th>
<th>Text Book Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kinematics &amp; Kinetics of Particles</td>
<td>Chapters 12 &amp; 13</td>
</tr>
<tr>
<td>Energy Methods for particles</td>
<td>Chapter 14: 14.1 to 14.6</td>
</tr>
<tr>
<td>Impulse and Momentum for particles</td>
<td>Chapter 15: 15.1 to 15.7</td>
</tr>
<tr>
<td>In-plane motion of rigid bodies</td>
<td>Chapter 16: 16.1 to 16.8</td>
</tr>
<tr>
<td>Rigid Body kinetics: Mass-Acceleration method</td>
<td>Chapter 17: 17.1 to 17.5</td>
</tr>
<tr>
<td>Planer Kinetics: Energy Method</td>
<td>Chapter 18: 18.1 to 18.5</td>
</tr>
<tr>
<td>Planer Kinetics: Impulse and Momentum method</td>
<td>Chapter 19: 19.1 to 19.4</td>
</tr>
</tbody>
</table>

**How To study Dynamics:**

Dynamics is a challenging subject; a key to your success is to read the material before each new class and solve all presentation problems, textbook examples, and homework assignment after every class. All course topics are dependent on each other; each new topic requires perfect understanding of all preceding topics. The shortest way to fall behind is to miss a class. Not only your attendance of every class is important, but you must pay full attention to my explanation. Remember that **the shortest way to fail dynamics is to fall behind.**

The problems in exams and quizzes will be very similar to those solved in class or assigned as homework or solved in the textbook preliminary or fundamental problems. Just reading the solution of problems will not do you any good; you must carefully visualize and understand every problem and develop your own *written* solutions as you would do in a closed book exam. This will include drawing neat and complete free body diagrams and inertia response diagrams, writing the dynamic equilibrium equations as well as any needed kinematic equations, and finally solving the equations numerically to obtain the required answers. Remember that if you do not study today’s lecture, the material will pile up, and you will not understand the material taught in the next lecture; you will fall behind. **Quizzes will be given to ensure that you do not fall behind on the course material.**

**Academic Integrity:**

The integrity of the degree offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Standards of academic integrity prohibit not only cheating or plagiarizing, but also the unethical conduct of trying to obtain class credit that one does not deserve. It is unethical to approach the instructor for a change in exam scores or a grade for any reason other than an indisputable mistake in grading acknowledged by the instructor. A student who approaches the instructor requesting a change of his/her indisputable class record will be dealt with in accordance to the WVU Code of Student Conduct. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code on http://campuslife.wvu.edu/t/download/220286.

**Social Justice:**

West Virginia University is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and non-discrimination. Our University does not discriminate on the basis of race, sex, age, disability, veterans status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Disability Services.