COURSE SYLLABUS

NUEN432 - NUCLEAR POWER PLANT FUNDAMENTALS
3 credit hours

COURSE SYLLABUS

Time and Location: This course will be delivered and evaluated as a distance education course. No on-campus class meetings will be scheduled.

Office: Moodle Course Page chat rooms (see communication)
Phone: 979-845-1179
Email: Tsvetkovag@tamu.edu

Credits: 3 credit hours
Instructor(s): Dr. Galina Tsvetkova

Prerequisites: Junior or Senior classification in the College of Engineering; non NUEN majors

Instructor Availability: on demand: Instructor will respond on your e-mail within 48 hours

Your teacher will be online with all of you at least every two days and will provide feedback within 48 hours on week days. However, if you have an urgent subject that you need to discuss with the teacher you should send an e-mail to the instructor and in this case do not forget to fill in the course name within the subject line.

For communication and HW submissions please take into account that our Black-board server operates on Central time (USA).

Communication:
- via E-mail, Moodle Course Page chat rooms: [http://nuclearpowerinstitutecourses.org/](http://nuclearpowerinstitutecourses.org/)
- phone 979-845-1179

Technical support: contact your instructor

Learning outcomes:
- Students will be able to recognize and recall the basics of nuclear reactor terminology, definitions, and concepts associated with reactor physics and theory and technology of nuclear power plant.
- Students will learn the principals of water chemistry control for nuclear power plant systems.
- Students will classify different materials and alloys in power plant applications and describe effects of radiation on them such as the fracture of nuclear fuel, stress development in the reactor vessel wall, erosion/corrosion effects.
- Students will apply their knowledge of basic electrical theory, basic alternating current (AC) and direct current (DC) theory in application to nuclear power.
- Students will apply their knowledge of mechanical engineering principals to the theory of valve fundamentals and components, pumps, turbines, vibration, and rotating equipment safety.
- Civil engineering design principals and considerations will be named.
- The construction and principle of operation of the different sensing and indicating devices used at power plants will be explained to students.

Textbooks/Lecture Notes:

Notes: Nuclear Power Plant Fundamentals lecture notes.

New course materials will be uploaded to the course webpage on a regular basis.

Major events such as HW dues and exams will be scheduled on the course webpage calendar.

Students are expected to check the course page regularly and be up-to-date with the course material, progress and assignments.

COURSE DESCRIPTION

Understanding the operation of a nuclear electric generation station; includes reactor water chemistry, material science, electrical science, mechanical science, civil engineering for nuclear power plant engineers, and digital process control systems.

The course is divided into seven sections (modules):

1. Introduction to Nuclear Power Plant
2. Water Chemistry for Nuclear Power Plant,
3. Material Science,
4. Electrical Science ,
5. Mechanical Science,
6. Civil Engineering for Nuclear Power Plant Engineers,

Introduction to Nuclear Power Plant. This module covers the basics nuclear reactor terminology, definitions, and basic concepts associated with reactor physics and theory and technology of nuclear power plant. Topics discussed in this section include:

- Reactor Physics. Introduction to Nuclear Power
  - Nuclear stability and radioactive decay
  - Nuclear reactions
  - Nuclear fission, fission products
  - Nuclear reactor fuels
- Different types of nuclear reactors by: fuel and coolants
- Thermal reactors: PWR, BWR
- Nuclear PP major Components for Thermal reactors
  - Components of the reactor vessel
  - Core, Shield
  - Heat Exchanger
  - Pressurizer
  - Condenser
- Coolant, moderator
- Control materials: Control Rods, Liquid materials, Installed poisons
- Creating Electricity

Water Chemistry for Nuclear Power Plants section of the course includes the basics chemistry terms, units, definitions, limits and basic concepts associated with chemistry control for nuclear power plant systems. Topics discussed in this section include

Fundamentals of Chemistry,
- Principles of Secondary Water Chemistry Control as applied to PWR
- Chemical and biofouling controls for auxiliary systems (PWR, BWR)
- Principles of reactor coolant system chemistry control for PWR and BWR (control and removal of impurities, radiochemistry).

Material Science section of the course explains the terms, definitions, and basic concepts associated with reactor plant materials and recognize conditions detrimental to the plant materials. Topics discussed in this section include
classification of crystalline materials, imperfections in materials, material behavior and metallurgical definitions, mechanisms of deformation and fracture, effects of radiation on materials, alloys and their power plant applications, nuclear fuel, stress developed in the reactor vessel wall, erosion/corrosion effects, nondestructive test methods.

**Electrical Science** section of the course starts with a review of basic electrical theory followed by an introduction to basic alternating current (AC) and direct current (DC) theory. Topic covered in this section include AC and DC circuits, motors and generators, batteries, voltage regulators, transformers, electrical distribution systems.

**Mechanical Science** section of the course covers the mechanical engineering principals for all engineers at a nuclear power plant. Topics discussed in this section include statics and dynamics, lubrication, bolting fundamentals, piping, valve fundamentals and components, pumps, turbines, vibration, rotating equipment safety.

**Civil Engineering for Nuclear Power Plant Engineers** section of the course starts with a review of statics followed by a discussion of structural materials used at nuclear power plants. The section is concluded with an introduction of civil design considerations.

**Digital Process Control Systems** section of the course covers the following topics: temperature measurement, pressure measurement, level measurement, flow measurement, control systems, and logic diagrams (digital control).

**COURSE OBJECTIVES**

The specific objectives of this course are the following:

**Introduction to Nuclear Power Plant**
- To recall the basics nuclear reactor terminology, definitions, and basic concepts associated with reactor physics and theory and technology of nuclear power plant.

**Water Chemistry**
- To classify the chemical properties of materials and the way these properties can impose limitations on the operation of equipment and systems.
- To explain principles of reactor coolant system chemistry control in PWR and BWR.

**Materials**
- To classify physical and mechanical properties of materials, types of stresses, and mechanisms of fracture and deformation.
- To outline different alloys and their power plant applications.
- To identify the stresses induced in the reactor vessel due to heatup and cooldown.
- To predict different types of mechanical and chemical corrosion, the consequences of their occurrence in a power plant, and methods available to minimize their occurrence.
- To recall various nondestructive testing methods and their primary applications.

**Electrical Science**
- To differentiate fundamentals of AC and DC theory.
- To be able to analyze various electrical circuits and describe the characteristics of elements placed in a circuit.

**Mechanical Science**
- To explain how lubrication is used in plant equipment.
- To define the most important aspects of bolting.
- To classify the piping systems, valves, pumps and their operating principles.
- To understand the fundamentals of steam turbines (component parts of a turbine, classification of turbines, basics of turbine operations).
- To explain the vibration monitoring and hazards associated with rotating equipment. Students will list machinery vibration conditions that are indicators of machine degradation or potential failure

**Civil Engineering**
- To define basic civil engineering concepts with respect to nuclear power plants
- To recall applicable major procedures and an awareness of when and how to seek a civil engineer's assistance.
Digital Process Control Systems (if time permits)
- To recall temperature, pressure, level, and flow measuring devices used at most nuclear power plants.
- To reproduce the measuring techniques, and be able to avoid misreading and other possible diagnose problems with measuring devises
- To classify various types of nuclear facility instrumentation and control systems.
- To interpret the logic diagrams and differentiate analog and digital control systems.

METHOD OF EVALUATION:

Attendance: This course will be delivered and evaluated as a distance education course. No on-campus class meetings will be scheduled. Students are expected to complete all assignments. If student missed the assignment or examination we will follow the University rules regarding approved absences, (http://student-rules.tamu.edu/rule07 for official policies and a link to the University absence form, and see http://student-rules.tamu.edu/append4 for rules regarding religious observances). Please submit a completed absence form with supporting material when requesting an excused absence. You must notify me of an absence in a timely fashion.

Lectures: The lectures will consist of interactive power point presentations, videos, handouts, and other educational materials. Students are responsible for the material covered in the course materials. The knowledge will be evaluated via homework assignments, short quizzes and take-home exams.
- New course materials will be uploaded to the course webpage on a regular basis.
- Major events such as HW dues and exams will be scheduled on the course webpage calendar.
- Students are expected to check the course webpage regularly and be up-to-date with the course material, progress and assignments.

The grades will be determined on the usual scale:

<table>
<thead>
<tr>
<th>Final Course Score</th>
<th>Final Course Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90% and above</td>
<td>A</td>
</tr>
<tr>
<td>80 - 89.5%</td>
<td>B</td>
</tr>
<tr>
<td>70 - 79.5%</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69.5%</td>
<td>D</td>
</tr>
</tbody>
</table>

Grades will be computed according to the table below.

<table>
<thead>
<tr>
<th>Homework Assignments and Short Quizzes :</th>
<th>20%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mid-term exam #1</td>
<td>25%</td>
</tr>
<tr>
<td>Mid-term exam #2</td>
<td>25%</td>
</tr>
<tr>
<td>Final exam</td>
<td>30%</td>
</tr>
</tbody>
</table>

Homework Assignments

HW assignments will be assigned every week. HW assignments will include weekly reading material and exercises. All assignments are due by midnight of the due date!

For communication and HW submissions please take into account that our Black-board server operates on Central time (USA).

Absolutely no late homework will be accepted, except for university excused absences.

- HW Preparation:

Different format of assessments and assignments will be used, such as: multiple choice questions and file submission/ uploading on the course webpage.

For uploaded HW file:

1. Download the original assignment-file from the course webpage. Make a copy of the original assignment-file, and rename it, including your name in the file-name. Type in the new file. Your
submitted HW-file has to contain your name and assignment number, for example:  
YourLastname_HW#.doc

2. Type your HW instead of handwriting, if possible.
3. You have to show all steps of your solution to allow Teaching Assistant easy follow-up.
4. For each question/ problem provide problem statement before your answer
5. If asked for a numerical result, give formula and number with units,
6. Appropriate use of engineering software will be encouraged but will not be required to complete  
course assignments.

• Submission of the HW solution sets:

All HW assignments need to be submitted electronically by uploading to course webpage and copy by  
e-mail to Tsvetkovag@tamu.edu

HW solution sets:
Work together is encouraged. The participating classmates must be listed on the first page. However,  
the final submitted assignments must be individual work efforts.

If blatant copying is detected for the first time, the score will be 0 for all involved

Late submission (1 week to explain and ask for a new due date):
If a student cannot submit his work by the due date, he has 1 week after the due date to explain  
the reasons for delay and ask for a new due date without GRADE PENALTY. If the student fails  
to contact instructor, the delayed work will not be accepted

Absolutely NO late submission of the HWs after 2 weeks of original assigned date

No assignments will be accepted after the last day of classes!

• Re-submission of HW sets:

• Students are expected to complete all assignments. If student missed the assignment or examination  
we will follow the University rules regarding approved absences, (http://student-  
rules.tamu.edu/rule07 for official policies and a link to the University absence form, and see  
http://student-rules.tamu.edu/append4 for rules regarding religious observances). Please submit a  
completed absence form with supporting material when requesting an excused absence. You must  
notify me of an absence in a timely fashion.

Examinations
Two major exams and a final exam will be given during the semester.

Exams must be submitted as defined in their corresponding assignments following the described submission  
process. All exams and projects will be assigned per student; no group work will be accepted.

A final exam for the class will be scheduled according to the approved University Final Examination Schedule.  
This exam will be comprehensive and cover all information discussed in lectures. Questions about exam scores  
must be submitted in writing within one week after the exams have been returned or the scores will be  
considered correct.
<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture#/ Date</th>
<th>Topic</th>
<th>Source and Reading material</th>
<th>HW Issued</th>
<th>HW Due</th>
</tr>
</thead>
</table>
| W1   | L01 Introduction | Syllabus overview, Introduction to NPP Fundamentals | Introduction02.doc  
L01_01Fund introduction. pptx  
L01_02Fund Syllabus overview.pptx | 000_Fund00_HW00.docx  
Due next lecture | |
| L02 Nuclear | 1. Nuclear Power plants  
a. Fuel, Coolant, moderator  
b. Controlling Fission rate  
c. Shielding  
d. Steam Generator, Creating Electricity, Cooling  
e. Reactor classification by fuel, coolant moderator  
f. PWR and BWR | Presentation: L02_Fund00_Nuclear01.pptx  
Lecture notes Fund00_Nucler_notes | HW1 | HW0 due |
| L03 | 1. Nuclear Physics Fundamentals  
a. Atomic structure, Nuclear Fission, nuclear Stability  
• Radioactivity and radiation  
• Neutron Interactions, neutron classification | Presentation: L03_Fund00_01Nuclear_02 and L03_Fund00_02Nuclear_03  
Lecture notes Fund00_Nucler_notes | |
| W2. | L04 Basic Nuclear and atomic physics:  
1. Energy and Mass relationships- 01  
2. Atomic Structure- 02  
3. Periodic table and chart of nuclides- 03 | Movies from http://nsspi.tamu.edu/nsep/courses/basic-nuclear-and-atomic-physics | |
| L05 | Basic Nuclear and atomic physics: (continue)  
4. Nuclear stability  
5. Fission  
6. Particle and electromagnetic radiation  
7. Radioactivity and radiation | Movies from http://nsspi.tamu.edu/nsep/courses/basic-nuclear-and-atomic-physics | HW2 F00 Nuclear | HW01 due |
<table>
<thead>
<tr>
<th>L06</th>
<th>difference between PWR and BWR</th>
<th>presentation L06_Fund00_Nuclear_04, Lecture notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>W3</td>
<td>L07</td>
<td>BWR, ABWR</td>
</tr>
<tr>
<td></td>
<td>Movie BWR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L08 F1. Water Chemistry for NPPs</td>
<td>Fundamentals of Chemistry (mixture, solution, compound, gases/vapors, conductivity, corrosion, pH, ion exchanger, inhibitor).</td>
</tr>
<tr>
<td></td>
<td>Lecture notes Chemistry Chapter 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L09 Water Chemistry for NPPs</td>
<td>Secondary System Water Chemistry Controls: (PWR only) Steam Generator and Secondary Chemistry Concerns, (PWR only) Secondary Water Chemistry Control Program, (PWR and BWR) Chemical and Biofouling Controls For Auxiliary Systems</td>
</tr>
<tr>
<td></td>
<td>Lecture notes Chemistry Chapter 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L10 Water Chemistry for NPPs</td>
<td>BWR (only) Principles of Reactor Coolant System Chemistry Control: Purpose of BWR Reactor Coolant System Chemistry Control, Purpose of Control of Water Quality, Control Parameters, Sources of Reactor Impurities, Impurity Removal, Radiochemistry.</td>
</tr>
<tr>
<td></td>
<td>Lecture notes Chemistry Chapter 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Material Science. Chapters 1-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Material Science Chapters 3-5</td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td>overview</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>Midterm 1</td>
</tr>
<tr>
<td>W6</td>
<td>L16</td>
<td>Basic Electrical Theory</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Electrical Science. Chapter 1. L16 Fund electrical 01 part2</td>
</tr>
<tr>
<td>L17</td>
<td></td>
<td>Basic DC Theory</td>
</tr>
<tr>
<td>L17</td>
<td></td>
<td>Battery</td>
</tr>
<tr>
<td>L18</td>
<td></td>
<td>DC Circuits</td>
</tr>
<tr>
<td>L18</td>
<td></td>
<td>Batteries</td>
</tr>
<tr>
<td>W7</td>
<td>L19</td>
<td>DC Generators</td>
</tr>
<tr>
<td>L19</td>
<td></td>
<td>DC Motors</td>
</tr>
<tr>
<td>L20</td>
<td></td>
<td>Basic AC Theory</td>
</tr>
<tr>
<td>L20</td>
<td></td>
<td>Basic AC Reactive Components</td>
</tr>
<tr>
<td>L21</td>
<td></td>
<td>Basic AC Power</td>
</tr>
<tr>
<td>L21</td>
<td></td>
<td>AC Generators</td>
</tr>
<tr>
<td>W8</td>
<td>L22</td>
<td>Voltage Regulators</td>
</tr>
<tr>
<td>L22</td>
<td></td>
<td>AC Motors</td>
</tr>
<tr>
<td>L23</td>
<td></td>
<td>Transformers</td>
</tr>
<tr>
<td>L23</td>
<td></td>
<td>Electrical Distribution Systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Week</td>
<td>Lecture</td>
<td>Course</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>--------</td>
</tr>
<tr>
<td>L24</td>
<td>4. Mechanical Science Ch1,2</td>
<td>Statics and Dynamics. Lubrication.</td>
</tr>
<tr>
<td>W9</td>
<td>L25_26</td>
<td>Mechanical Science Ch3</td>
</tr>
<tr>
<td></td>
<td>L26</td>
<td>Mechanical Science Ch3</td>
</tr>
<tr>
<td></td>
<td>L27</td>
<td>Mechanical Science Ch4</td>
</tr>
<tr>
<td>W10</td>
<td>L28</td>
<td>Mechanical Science Ch5</td>
</tr>
<tr>
<td></td>
<td>L29</td>
<td>Mechanical Science Ch6</td>
</tr>
<tr>
<td></td>
<td>L30</td>
<td>Mechanical Science Ch7</td>
</tr>
<tr>
<td>W11</td>
<td>L31</td>
<td>Mechanical Science Ch8,9</td>
</tr>
<tr>
<td></td>
<td>L32</td>
<td>Overview of Mechanical Engineering</td>
</tr>
<tr>
<td></td>
<td>L33</td>
<td>Reading day. No classes.</td>
</tr>
</tbody>
</table>
## COURSE SYLLABUS

### NUCLEAR POWER PLANT FUNDAMENTALS

<table>
<thead>
<tr>
<th>W12</th>
<th>L34</th>
<th>Exam 2: covers Electrical / Mechanical Science</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>L35</td>
<td>5. Civil Engineering</td>
<td>Civil Fundamentals</td>
<td>Civil Engineering. <strong>Chapter 1</strong></td>
</tr>
<tr>
<td></td>
<td>Civil Material &amp; Components</td>
<td>Civil Engineering</td>
<td>Civil Engineering <strong>Chapter 2</strong></td>
</tr>
<tr>
<td></td>
<td>Civil Design Considerations</td>
<td>Civil Engineering</td>
<td>Civil Engineering <strong>Chapter 3</strong></td>
</tr>
<tr>
<td>L36</td>
<td>6. Control</td>
<td>Temperature Measurement</td>
<td>Instrumentation and Control <strong>Chapter 1</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>W13</th>
<th>L37</th>
<th>Pressure Measurement</th>
<th>Instrumentation and Control <strong>Chapter 2</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>L38</td>
<td>6. Control</td>
<td>Level Measurement</td>
<td>Instrumentation and Control <strong>Chapter 3</strong></td>
</tr>
<tr>
<td>L39</td>
<td>6 Control</td>
<td>Flow Measurement</td>
<td>Instrumentation and Control <strong>Chapter 4</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>W14</th>
<th>L40</th>
<th>Control Systems</th>
<th>Instrumentation and Control <strong>Chapter 5</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6. Control</td>
<td>Logic Diagrams (Digital Control)</td>
<td>Instrumentation and Control <strong>Chapter 6</strong></td>
</tr>
<tr>
<td>41</td>
<td>Reading day. No classes</td>
<td></td>
<td>Due HW10</td>
</tr>
<tr>
<td>42</td>
<td>Final exam. Covers everything</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

HWs due dates and order of lectures are subject to change. Please refer to the calendar posted on the website [http://nuclearpowerinstitutecourses.org/](http://nuclearpowerinstitutecourses.org/).
ADA STATEMENT
The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, currently located in the Disability Services building at the Student Services at White Creek complex on west campus or call 979-845-1637. For additional information visit http://disability.tamu.edu.

ACADEMIC INTEGRITY STATEMENT:
"An Aggie does not lie, cheat, or steal or tolerate those who do." (Honor Council Rules and Procedures: http://aggiehonor.tamu.edu)

ACADEMIC DISHONESTY:
As commonly defined, plagiarism consists of passing off as one’s own the ideas, work, writings, etc., that belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even if you have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated. If you have questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules [http://student-rules.tamu.edu/], under the section "Scholastic Dishonesty."

Professional behavior: an important attribute of your professional development is that you act and speak in a manner that does not offend others, giving particular care to diversity issues.

Religious holidays: Observance of a religious holiday, to be excused the student must notify his or her instructor in writing (acknowledged e-mail message is acceptable) prior to the date of absence if such notification is feasible. In cases where advance notification is not feasible (e.g. accident, or emergency) the student must provide notification by the end of the second working day after the absence. This notification should include an explanation of why notice could not be sent prior to the class. Accommodations sought for absences due to the observance of a religious holiday can be sought either prior or after the absence, but not later than two working days after the absence.

University writing center: The University Writing Center (UWC), located in Evans Library 1.214 (second floor), offers help to writers at any stage of the writing process including brainstorming, researching, drafting, documenting, revising, and more; no writing concern is too big or too small. These sessions are highly recommended but are not required and will not directly affect your final grade. While the UWC consultants will not proofread or edit your papers, they will help you improve your own proofreading and editing skills. If you visit the UWC, take a copy of your writing assignment. To find out more about UWC services or to schedule an appointment, call 458-1455, browse the web page at uwc.tamu.edu, or stop by the center.

Courtesy notice: Students are encouraged to behave in a professional, respectful and courteous manner. The use of cell phones is forbidden and your phones should be turned off during the class time. Please no food and/or snack during the class. You may have your snack before class begins or after the class.

ATTENDANCE
Class attendance is required and students are expected to complete all assignments. We will follow the University rules regarding approved absences, (http://student-rules.tamu.edu/rule07 for official policies and a link to the University absence form, and see http://student-rules.tamu.edu/append4 for rules regarding religious observances). Please submit a completed absence form with supporting material when requesting an excused absence.

Unexcused absences: Students who miss class without prior approval of their instructor will receive a grade of zero on the missed in quiz. University excused absences: Authorized absences must be approved by your instructor in advance of the absence, unless you have an emergency or illness. Make-up work must be completed outside of normal class hours within ONE WEEK following an excused absence. IT IS YOUR RESPONSIBILITY to see your teacher and make arrangements for make-up work.
COPYRIGHT NOTICE

The handouts used in this course are copyrighted. By “handouts,” this means all materials generated for this class, which includes but is not limited to syllabi, quizzes, exams, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless expressly granted permission.
**Galina V. Tsvetkova**  
(979)-575-4387, Tsvetkovag@tamu.edu

---

**Education**

<table>
<thead>
<tr>
<th>Year</th>
<th>Certification</th>
<th>Department/Institution</th>
<th>Online Teaching, Curriculum development</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>Certification</td>
<td>TAMU Department of Instruction Technology Services</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>Ph.D.</td>
<td>Dept. Nuclear Engineering, Texas A&amp;M University</td>
<td>Nuclear Engineering</td>
</tr>
<tr>
<td></td>
<td>Advisor: Dr. K.L. Peddicord</td>
<td>Title: An Autonomous Long-Term Fast Reactor System and the Principal Design Limitations of the Concept</td>
<td></td>
</tr>
<tr>
<td>1995</td>
<td>Engineer-Physicist (Equivalent of US Master of Science Degree in Physics)</td>
<td>College of Technical Physics, Department of Molecular Physics, Moscow State Engineering Physics Institute (MEPhI) (Technical University), Russia</td>
<td>Molecular physics and physics of kinetic phenomena</td>
</tr>
</tbody>
</table>

**Professional Experience**

- Physics of separations phenomena, isotope separations, membrane separation technologies
- Reactor design and safety, reprocessing
- Software development for physics calculations in Nuclear Engineering and Molecular physics areas (neutronics, molecular dynamics and separations phenomena)
- **Professional Certification for Online teaching:**
  - Creating an Effective online Syllabus
  - Course design and course development in on-line format
  - Movie and audio production by Camtasia Studio, Respondus, Audacity
  - Designing course webpages using SoftChalk
  - Learning management systems: eLearning, Moodle, eCampus
  - Live webconferences using TTVN WebMeeting application for webconference (http://ttvnwebmeeting.tamu.edu/)
- **Teaching experience**
  - Analytical and Numerical Methods (Programming and Computer applications, Linear and non-linear systems of equations, Finite element methods in application of heat conduction and neutron diffusion problems, ODEs, PDEs)
  - Nuclear Reactor Theory
  - Reactor physics and Nuclear power plant fundamentals,
  - Water Chemistry for Nuclear Power Plant (PWR/BWR)
  - Material Science: classification and utilization of different materials and alloys in power Plants.
  - Effects of radiation on materials
  - Electrical Science: AC and DC circuits, motors and generators, batteries, voltage regulators, transformers, electrical distribution systems in Power Plant applications.
  - Mechanical Science: statics and dynamics, lubrication, bolting fundamentals, piping, valve fundamentals and components, pumps, turbines, vibration, rotating equipment safety
  - Civil Engineering for Nuclear Power Plant Engineers,
  - Power Plant Instrumentation: (Measurements of temperature, pressure and flow)
  - Nuclear Reactor Operations, Process Control, Nuclear Reactor Kinetics and Control, Transient modeling and analysis, Digital Process Control Systems
- **Courses taught at TAMU:** NUEN 301, NUEN 329, NUEN 432, NUEN 435, NUEN460
Work experience

- **Jan 2009 To Current**: Senior research Associate / Lecturer at The Texas A&M University System, Texas Engineering Experiment Station, 253 Bizzel Hall West, College Station, TX, 77843 – 3133 USA. Curriculum development. Syllabus preparation. Preparation and teaching of face-to-face and online classes: Analytical and Numerical Methods, Reactor Physics, Nuclear Power Plant Fundamentals, Reactor Operations, Process Control, Nuclear Reactor Kinetics and Control classes. Prepare lessons that reflect accommodations for differences in student learning styles. Plan and use appropriate instructional and learning strategies, activities, materials, and equipment that reflect understanding of the learning styles and needs of students assigned.

- **Mar 2008- Jan 2009** Postdoctoral Research Associate. The Texas A&M University System, Texas Engineering Experiment Station. Preparation of proposals, assistance in preparing course syllabuses and supporting educational materials, outreach activities.


  1) Development of numerical methods and computer codes for solving neutron transport equation
  2) Reactor physics study of the advanced HTGR design characteristics
  3) Reactor physics study of the advanced and innovative nuclear systems with fast neutron spectrum


Recent Professional Development and Service

- **Nov 2014**: Certificate. Time Management Fundamentals from Lynda.com
- **Nov 2014**: Certificate. Getting Things Done from Lynda.com
- **Jan 2014**: Certificate. Improving Your Judgment from Lynda.com
- **May 2014**: Annual Staff Workshop, TAMU
- **Dec 2013-Jan, 2014**: Moodle2.1 Essential Training for teachers form Lynda.com
- **March 2015**: Training: Teaching with Technology Conference, TAMU, Instructional Technology Services
- **2015 - 2016**: Explorations: the Texas A&M Undergraduate Journal reviewer
- **May 2015**: Annual Staff Workshop, TAMU
- **May 2016**: Mitchell Scholarship committee, TAMU
- **May 2016**: Annual Staff Workshop, TAMU
- **Feb 2017**: Pedagogy Workshop - Short-Writing Assignments, TAMU
- **March 2017**: Pedagogy Workshop - Developing an Online Course, TAMU

Publications


(9) **G.V. Tsvetkova**, K.L. Peddicord, Y. Hassan, Arkal S. Shenoy, Matt Richards, and Chris Ellis. *Analysis of the Modular Helium Reactor for a Hydrogen Production Plant*. Accepted, ANS Annual Meeting, November 2004, Washington DC, USA
