

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

School of Public Safety and Health
FSMT 102 (Formerly GM292)
Fire Behavior And Combustion
3 Credit Hours
8-Weeks
Prerequisite(s): None

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Instructor Information

Instructor:

Email:

Phone:

Office Hours:

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Course Description (Catalog)

This course explores the theories and fundamentals of how and why fires start, spread, and how they are controlled.

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Course Scope

The scope of FSMT 102 (formerly GM292) *Fire Behavior* is to meet the levels of mastery established by the National Fire Academy, NFPA 1021 and NFPA 1033. These standards are agreed upon by professionals across the fire service community as the foundational benchmarks that all individuals should know at the completion of this course. I encourage all of you to view the NFA link for this course in the bibliography. By the end of this course you will be able to discuss and have a through knowledge of the learning objectives listed in the next session.

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Course Objectives

- ❖ Identify physical properties of the three states of matter.
- ❖ Categorize the components of fire.
- ❖ Recall the physical and chemical properties of fire.
- ❖ Describe and apply the process of burning.
- ❖ Define and use basic terms and concepts associated with the chemistry and dynamics of fire.
- ❖ Describe the dynamics of fire.
- ❖ Discuss various materials and their relationship to fires as fuel.
- ❖ Demonstrate knowledge of the characteristics of water as a fire suppression agent.
- ❖ Articulate other suppression agents and strategies.
- ❖ Compare other methods and techniques of fire extinguishments.

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Course Delivery Method

This B.S. in **Fire Science Management** course delivered via distance learning will enable students to complete academic work in a flexible manner, completely online. Course materials and access to an online learning management system will be made available to each student. **Online assignments are due by the last day of each week (Sunday)** and include Discussion Board questions (accomplished in groups through a threaded discussion board), examinations and quizzes (graded electronically), and individual assignments (submitted for review by the Faculty Member). Assigned faculty will support the students throughout this eight-week course.

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Course Materials

Shackelford, Raymond. (2009). *Fire Behavior and Combustion Processes, 1st Edition*. Clifton Park, NY: Delmar Publishers. ISBN# 9781401880163.

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Evaluation Procedures

Grades for this course will be based upon three grading instruments; papers, discussions and a final exam. There are 8 discussion Forum questions that are provided in the **Forum Portion of the Classroom**. The student – when directed by the instructor -- will respond to the posting of other students.

The grade scale and due dates for each of the evaluation are provided below:

<u>Grade Instruments:</u>	<u>Points</u>	<u>% of Final Grade</u>
Forum Topic 1	100pts	6.25%
Forum Topic 2	100pts	6.25%
Forum Topic 3	100pts	6.25%
Forum Topic 4	100pts	6.25%
Forum Topic 5	100pts	6.25%
Forum Topic 6	100pts	6.25%
Forum Topic 7	100pts	6.25%
Forum Topic 8	100pts	6.25%
Week 2 Paper	100pts	10%
Week 4 Paper	100pts	10%
Week 6 Paper	100pts	10%
Week 8 Final Paper	100pts	10%
Week 8 Final Exam	<u>100pts</u>	<u>10%</u>
	1300pts	100%

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Grading Scale

<u>Grade</u>	<u>Quality Points</u>	<u>Grading Percentage</u>	<u>Description</u>
A	4.0	100-94	Excellent
A-	3.67	93-90	
B+	3.33	89-87	
B	3.0	86-84	Above Average
B-	2.67	83-80	
C+	2.33	79-77	
C	2.0	76-73	Average/Minimum Performance Level Expected

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C-	1.67	72-70	
D+	1.33	69-67	Unsatisfactory
D	1.0	66-64	Unsatisfactory
D-	.67	63-60	Unsatisfactory
F	0.0	59-0	Failing
I	NONE	NONE	Incomplete
DP	NONE	NONE	Dropped
W	NONE	NONE	Withdrawn
WP	NONE	NONE	Withdrawn Passing
WF	NONE	NONE	Withdrawn Failing
X	NONE	NONE	Audit grade: No Academic Credit awarded

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Course Outline

<u>Week</u>	<u>Topic(s)</u>	<u>Learning Objective(s)</u>	<u>Reading(s)</u>	<u>Assignment(s)</u>
1	The American Fire Service: The past, present, and future. Fire chemistry	<ul style="list-style-type: none"> ❖ Examine how the history of our society has shaped the American attitude toward fire prevention and fire control efforts. ❖ Describe and explain how other countries approach the control of fires and compare and contrast their approach with U.S. efforts. ❖ Describe new technologies and systems the fire service has implemented in recent years. 	Chapters 1 and 2	Submit a brief Biography to the Forum

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		<ul style="list-style-type: none"> ❖ Describe the fire service of today, its successes, its problems, and its efforts toward improvement. ❖ Examine and envision the challenges and opportunities open to the fire service in the twenty-first century. ❖ Understand and explain the basic structure of atoms. ❖ Explain how atomic structure determines the behavior of elements and compounds. ❖ Understand basic chemical and physical properties and concepts and how they influence the behavior of materials involved in fires and hazardous materials incidents. ❖ Correlate chemical structure with chemical names to allow for a general prediction of some hazardous chemical behaviors. ❖ Understand key physical properties of chemicals and how these properties are related to fire protection. 		
2	Combustion processes	<ul style="list-style-type: none"> ❖ Explain the theories underlying combustion processes. ❖ Describe how fire researchers have identified combustion processes using a variety of different classifications. ❖ Provide a description of the stages and events of fire as it progresses from the initial stage to its final stage. ❖ Explain the causes of flame over, flashover and backdraft and review the procedures to prevent and protect against such events. ❖ Describe the various methods by which heat and unburned gases move in a confined environment. ❖ Define the five classes of fires and explain how they are classified. 	Chapter 3	Week 2 Paper Due Forum Topic
3	Extinguishing agents	<ul style="list-style-type: none"> ❖ Review and examine the basic components of the fire extinguishment process. ❖ Review the five basic classifications of fire and explain the various types of agents used to extinguish or control 	Chapter 4	Forum Topic

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		<p>fires in these five classifications.</p> <ul style="list-style-type: none"> ❖ Examine in detail the variety of agents used for fire extinguishment and explain the application methods for each of these agents. ❖ Identify and explain the benefits of using the latest technological advances in fire extinguishing agents such as compressed air foam and ultrafine water mist systems. 		
4	Foundations of fire fighting tactics and strategies	<ul style="list-style-type: none"> ❖ Describe the process of developing the firefighting strategy and tactics involved in planning, locating, confining, extinguishing, and overhauling fires in buildings and other special fire situations. ❖ Discuss the methods used for the determination of the proper fire operating mode: offensive, transitional, defensive, or non-attack mode. ❖ Define the term size-up and explain the steps and factors involved in making a size-up. ❖ Review the fire strategy and tactics used by firefighters and apply the fire behavior characteristics discussed in the text to the situations reviewed. ❖ Describe difficult fire situations encountered by firefighters and the strategies and tactics they should use to resolve these situations. 	Chapter 5	<p>Week 4 Paper Due</p> <p>Forum Topic</p>
5	Special concerns in firefighting	<ul style="list-style-type: none"> ❖ Explain prefire and postfire planning processes and describe how these activities will ensure safe, efficient, and effective firefighting activities. ❖ Describe fire behavior in confined enclosures with and without ventilation activities. Explain the various methods of ventilation and how each method impacts fire behavior. ❖ Explain the activities of salvage and overhaul and their role in fire extinguishment, and methods used to reduce further property loss. 	Chapter 6	Forum Topic

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		<ul style="list-style-type: none"> ❖ Explain the procedures used to ensure that utilities do not threaten the safety of the building or its occupants. 		
6	High-rise building fires and wildland fires	<ul style="list-style-type: none"> ❖ Understand and explain why high-rise buildings present a difficult and different fire problem for firefighters, including the unique fire behavior problems that may be encountered in a high-rise fire. ❖ Recognize the difference in construction methods of high-rise buildings and explain how different construction materials and designs impact fire behavior in these buildings. ❖ Describe the firefighting strategies and tactics used to locate, confine, and extinguish high-rise fires. ❖ Describe the special problems that may be encountered on high-rise fires such as communications issues, the stack effect, ventilation concerns, evacuation issues, and elevator control. ❖ Describe and explain the purpose of the special fire protection equipment which may be found in high-rise buildings. ❖ Describe when a stairwell support system may be needed. ❖ Explain the basic fire combustion principles and be able to apply them to wildland fires, and differentiate wildland fire behavior from structural fire behavior. ❖ Examine how weather conditions impact wildland fuels and the behavior of wildland fires. ❖ Describe the various parts of a wildland fire and identify how fire behavior impacts the methods of firefighting wildland fires. Include some of the special techniques needed to extinguish and control these fires. ❖ Describe the method used to classify resources used on wildland fires and how fire behavior impacts the type and amount of resources needed to suppress wildland fires. ❖ Describe the various resources and tools used in 	Chapters 7 and 8	Week 6 Paper Due Forum Topic

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		extinguishment of wildland fires.		
7	Transportation fires and related safety issues	<ul style="list-style-type: none"> ❖ Examine fire behavior and safety-related problems in transportation vehicles encountered by firefighters. ❖ Describe fire problems and safety issues experienced with transportation vehicles and explain actions that may be taken to resolve the issues. ❖ Examine and describe special fire behavior problems one might encounter with each of the classification of transportation vehicles. ❖ Explain the importance of fire preplanning and familiarization procedures for each of the categories of transportation vehicles. 	Chapter 9	Study For Final Exam Forum Topic
8	Hazardous materials and warning systems	<ul style="list-style-type: none"> ❖ Describe the U.S. Department of Transportation hazardous materials warning system, including its advantages and disadvantages. ❖ Describe the National Fire Protection Association standard 704 warning system, including its advantages and disadvantages. ❖ Explain the requirements, purposes, and value of Materials Safety Data Sheets to first responders. ❖ Explain the types of information available for first responders contained in the 2008 Emergency Response Guidebook. ❖ Describe the responsibilities and duties of state and local emergency planning committees and how their plans and documents assist first responders with information. ❖ Explain the issues that make weapons of mass destruction incidents complex and the reasons for the development of the National Incident Management System. 	Chapter 10	Week 8 Final Paper Due Forum Topic Final Exam

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Polices

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ACADEMIC DISHONESTY: PLAGIARISM AND CHEATING

The University System supports and promotes academic honesty and personal integrity.

Cheating can take the following forms:

- Submitting another person's work
- Writing a paper for someone else
- Working in a group effort without faculty consent
- Buying a paper from a research service
- Getting outside help or giving outside help without a teacher's expressed permission
- Submitting the same work for credit without approval (e.g. submitting the same assignment twice for different courses)

The Web & Plagiarism Note: The Web has made it quite easy to copy and insert materials into a paper. Students must be careful to properly attribute materials found on the Web. In a collegiate setting, attribution typically relies on a formal academic style manual for its citation models (See [Citation and Reference Style](#)). Such models describe how to append footnotes and endnotes, when:

- Quoting another's exact words, you are obviously expected to name the author and place the words in quotation marks or in indented text blocks. The citation number is placed immediately at the end of the quotation.
- Acknowledging background sources to your own descriptions---. The citation number is normally placed at the end of the paragraph.

Note: The University offers tools in its [Online Library Research Center](#) to help you analyze your papers for possible plagiarism violations and for instructors to uncover such activities.

APA WRITING EXPECTATIONS

All written submissions should be submitted in a font and page set-up that is readable and neat. It is recommended that students try to adhere to a consistent format, which is described below.

- Typewritten in double-spaced format with a readable style and font and submitted inside the electronic classroom (unless classroom access is not possible and other arrangements have been approved by the professor).
- Arial 11 or 12-point font or Times New Roman styles.
- Page margins Top, Bottom, Left Side and Right Side = 1 inch, with reasonable accommodation being made for special situations and online submission variances.

CITATION AND REFERENCE STYLE

Assignments completed in a narrative essay or composition format must follow APA Citation Style guidelines. This course will require students to use the citation and reference style established by APA: American Psychological Association. (2009). *Publication manual of the American psychological association*. (6th ed.). Washington, DC: American Psychological Association

COURSE EXTENTIONS

Students must determine the need for their first Course Extension and submit their "Request Course Extension" form *before* the end of the grading period (14 days after the end date of the course). If a final grade has been posted in the course, the student may still be eligible to request an extension; however, the extension form will not be available to the student inside the campus. In this case, the student must email the professor and carbon copy (cc) registrar@apus.edu to request an extension. For a student to be eligible they must have successfully completed 50% of the assigned work at the time of the extension request.

Courses may be extended in 30-day intervals for a maximum of 60 days. Students who will be prevented from participating in a course due to extenuating circumstances may be eligible for [Deployment and/or Special Circumstances extension](#).

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LATE ASSIGNMENTS

For each week that an assignment is late, two points may be deducted from your grade for the assignment unless the student contacts the instructor ahead of time about an extenuating situation.

DISABILITY ACCOMODATIONS

This institution complies with the [Americans with Disabilities Act, Section 504 of the Rehabilitation Act](#), and the [World Wide Web Consortium's \(W3C\) Universal Access Guidelines](#). Students with special needs should inform their individual instructors and the University's student services staff.

NETIQUETTE

Online universities promote the advance of knowledge through positive and constructive debate--both inside and outside the classroom. Discussions on the Internet, however, can occasionally degenerate into needless insults and "flaming." Such activity and the loss of good manners are not acceptable in a university setting--basic academic rules of good behavior and proper "Netiquette" must persist. Remember that you are in a place for the fun and excitement of learning that does not include descent to personal attacks, or student attempts to stifle the discussion of others.

- **Technology Limitations:** While you should feel free to explore the full-range of creative composition in your formal papers, keep e-mail layouts simple. The Educator classroom may not fully support MIME or HTML encoded messages, which means that bold face, italics, underlining, and a variety of color-coding or other visual effects will not translate in your e-mail messages.
- **Humor Note:** Despite the best of intentions, jokes and--especially--satire can easily get lost or taken seriously. If you feel the need for humor, you may wish to add "emoticons" to help alert your readers: ;-), :), ☺

DISCLAIMER STATEMENT

Course content may vary from the outline to meet the needs of this particular group.

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Academic Services

ONLINE LIBRARY RESEARCH CENTER & LEARNING RESOURCES

The Online Library Resource Center is available to enrolled students and faculty from inside the electronic campus. This is your starting point for access to online books, subscription periodicals, and Web resources that are designed to support your classes and generally not available through search engines on the open Web. In addition, the Center provides access to special learning resources, which the University has contracted to assist with your studies. Questions can be directed to orc@apus.edu.

- **Charles Town Library and Inter Library Loan:** The University maintains a special library with a limited number of supporting volumes, collection of our professors' publication, and services to search and borrow research books and articles from other libraries.

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- **Electronic Books:** You can use the online library to uncover and download over 50,000 titles, which have been scanned and made available in electronic format.
- **Electronic Journals:** The University provides access to over 12,000 journals, which are available in electronic form and only through limited subscription services.
- **Turnitin.com:** Turnitin.com is a tool to improve student research skills that also detect plagiarism. Turnitin.com provides resources on developing topics and assignments that encourage and guide students in producing papers that are intellectually honest, original in thought, and clear in expression. This tool helps ensure a culture of adherence to the University's standards for intellectual honesty. Turnitin.com also reviews students' papers for matches with Internet materials and with thousands of student papers in its database, and returns an Originality Report to instructors and/or students.
- **Smarthinking:** Students have access to 10 free hours of tutoring service per year through Smarthinking. Tutoring is available in the following subjects: math (basic math through advanced calculus), science (biology, chemistry, and physics), accounting, statistics, economics, Spanish, writing, grammar, and more. Additional information is located in the Online Research Center. From the ORC home page, click on either the "Writing Center" or "Tutoring Center" and then click "Smarthinking." All login information is available.

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Selected Bibliography

- Cote, Arthur E., P.E., Editor-in-Chief; **Fire Protection Handbook** (Various Editions), National Fire Protection Association, Quincy, Massachusetts, (Various Dates); ISBN 0-87765-378-x.
- DiNunno, Philip J., P.E., Editor in Chief, **SFPE Handbook of Fire Protection Engineering**, NFPA, Quincy, MA, ISBN 0-87765-853-4