Aerodynamics - Autorotation

Autorotation is the state of flight where the main rotor system is being powered by the kinetic energy of the air rather than engine power. It is the means by which a helicopter can be landed safely in the event of an engine failure. In this case, the potential energy of altitude is converted to kinetic energy during the descent and autorotation. All helicopters must have this capability in order to be certified. Autorotation is possible owing to a governor system, which allows the main rotor to continue turning even if the engine is not running.

In normal powered flight, air is drawn into the main rotor system from above and exhausted downward. During autorotation, airflow enters the rotor disc from below as the helicopter descends. See Figure 6-1.

Figure 6-1: During autorotation, the upward flow of relative wind past the main rotor blades causes the blades to rotate at their normal speed. In effect, the blades are "flying" in the rotational plane.

James E. Pyles
FAASTeam
12/12/2012
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Introduction

This publication is designed to provide basic guidance on how to provide course content using the on-line course component of FAASafety.gov. The use of hyperlinks is widely used throughout this publication to facilitate quick and easy access to information. Each link is clearly identified by the use of underlined and blue text.

The courses found on FAASafety.gov are intended to serve the aviation community first and foremost as a safety learning resource offering relevant, timely, and high-quality safety content to pilots and aviation maintenance technicians (AMTs). It is also intended to provide a portal to valuable aviation safety courses located elsewhere in cyberspace.

A strong partnership between the FAA Safety Team (FAASTeam) and the aviation community is essential to achieving these goals, especially with respect to course content. Accordingly, the purpose of this guide is to assist potential content contributors from both the FAA and aviation community by describing:

- Guidelines and standards for course development
- Processes for content review, acceptance, and publication
- Expectations for ongoing maintenance, review, and update of content
- Requirements for documentation of, and timely response to, feedback
These guidelines are provided for those desiring to produce online course content to be located on FAASafety.gov. In all cases, the FAASTeam expects all course contributors to:

- Know and comply with [Section 508](#) Rehabilitation Act accessibility requirements wherever possible;
- Refrain from promoting / endorsing commercial products,
- Refrain from derogatory statements about the FAA; and
- Maintain a focus on aviation safety information, training, and education

Note: Only Microsoft Internet Explorer 9.0, 32 bit version, is directly supported. Most items have also been tested using Google Chrome 23.0 and appear to work there as well. There are many known problems using any 64 bit browser versions. This is not to be confused with running this site within a 64 bit operating system such as Windows 7. The site has been tested extensively in this environment and no major bugs have been found. At the time of this revision there has been no testing done with Windows 8, Android, or tablet operating systems.

Questions, comments, and suggestions for future versions of this document are welcome. Please send to: [CourseSupport@FAASafety.gov](mailto:CourseSupport@FAASafety.gov)
Online Courses

The purpose of the online course section of FAASafety.gov is to offer airmen a convenient, informative, and interesting means of continuing aviation education on a wide range of safety topics.

A. Content Guidelines

Subject Matter

Content for online courses must be:

- Informational or educational in nature
- Relevant to aviation safety
- Relevant to the mission of the FAASTeam
- Clearly presented, and
- Relevant to the site’s general audience

To avoid wasted effort, potential course authors provide a proposed course outline to the FAASTeam prior to beginning work. The outline should include:

- Title
- Description
- Course Objectives
- Category or categories to which the course should be assigned
- Author(s)
• Estimated time required by the student to complete the course, including any end-of-course exam
• WINGS - Pilot Proficiency Program credit value requested, if applicable
• AMT Awards Program credit hours requested, if applicable
• Outline of chapters and sections
• Exam size (see guidelines, click here)

Send proposed course information and outline to: CourseSupport@FAASafety.gov

Types of Courses.

The FAASTeam seeks to populate the online course catalog with courses on a number of subjects and ranging from “full-length” (50 minutes or more to complete) to “mini-courses” that can be completed in 15-50 minutes. Course authors are strongly encouraged to use the “additional media” feature of the course authoring interface to create a complete content “package” for online course users.
For example, related media for the existing Flight Review Prep Guide course includes links to Advisory Circulars (ACs) and Plane Sense Handbook (FAA-H-8083-19). Other types of related media may include links to appropriate sections of the Aeronautical Information Manual (AIM), Aviation handbooks, and other supporting material.

**Note:** related media file names should not include any special characters such as “/ $ % & or *.

---

**Format Requirements.**

The [FAASafety.gov](https://www.faa.gov) course authoring interface is designed for ease of use by course authors and users, and to ensure that online courses and other site content have a consistent look and feel. The course authoring interface generates a form (described below) in which the course author provides basic information about the course, and it requires that courses be organized by chapter and section. Certain chapters -- Introduction and Review -- are required by default. In addition at least one content chapter must be included. The Table of Contents, where appropriate, for the course is created by the author as a discrete section in the Introduction chapter.
Although users can print course content directly from individual chapter and section windows, the FAASTeam requests, when appropriate, that each course also include a printer-friendly PDF version for those who wish to print and study content offline. This link may be provided in the introduction and/or review chapters, as the author desires.

B. Course Development Process

NOTE: Online Courses are organized according to subject (e.g., “Weather”) and audience (e.g., “Airmen-Pilots”) categories. Most courses can be assigned to one or more of the existing course categories (shown below).

If you find the need to add an additional course category that better describes your course subject and materials please make your request to: CourseSupport@FAASafety.gov. Please include the category name and a brief description or definition for the category in your request.

Add a New Course

NOTE: Before beginning this process; you must have an account established on FAASafety.gov and have been given the proper permissions to be a course provider. If you have not already done so, please request these permissions from: CourseSupport@FAASafety.gov

To begin the process, a user who has course authoring permission should mouse-over the Administration tab on the main navigation bar and select Courses from the dropdown menu.
The next page presents a list of course management tools. What you see on this page will depend on the permissions you have as a course manager. To begin development of a new course select “Create New” from the menu.
The next step in adding a new course is to complete the course information dialog box that appears when the Create New link is selected.

Begin by filling in the course title, course description, and assign the course to one or more categories. If already listed, the course author’s name may be selected from the course author dropdown list.

As the course develops, the author will return to this dialog box (using the “modify” option for a course in progress) to add chapters, sections, content, and exam questions & correct answers. The information on this page can be revised as needed during the process of course development.
Using *Add Exam Question* brings up a dialog box for multiple choice question stems, true/false and yes/no questions, answer choices, and a box to designate the correct answer. The author must also designate exam size and may designate questions that will appear on every exam. More information on course exams is contained later in this document.

A number of Feedback Forms are available so course authors may obtain airmen comments and suggestions to improve the course. The default is “Course Rating” so at least a minimum rating can be captured for each course.

If the course is to receive AMT or WINGS accreditation check the box provided at the bottom of the course information page. A new set of options will appear to help you determine the appropriate syllabi, credit value, and other criteria needed by the FAASTeam to determine accreditation. See *appropriate section* of this document for more information.

**Adding Course Content**

The course authoring interface requires four chapters by default: an introduction (which should include a table of contents section), at least one content Chapter, a review chapter, and an exam. The interface requires at least one section (with appropriate section heading) for each chapter.

To get started, click on "Edit" to the right of the chapter for which you would like add or modify content. A new window will appear as described below. We will start at the beginning in this example - the Introduction.

**NOTE:** Remember the Introduction and Review are required "chapters" for each course and consequently may not be deleted.
This illustration shows the dialog box for adding sections to a chapter.

Click on "ADD NEW SECTION" and add the information required for each section added. You will have a very nice editor interface available to you as the next example illustrates.
As you add sections to each chapter they will appear in the Chapter Sections screen. Up and Down arrows will appear that allow the sections within a chapter to be reordered if needed.

The “edit” link will allow you to edit content and the “delete” link will erase that entire section.

Continue adding appropriate chapters and chapter sections to your course. Soon you will have all of your course materials completed.

There is a separate authoring/editing box for each individual section. Be sure to use the Save in Progress button to save each section before moving on.

NOTE: All sections of a chapter appear in a single window whenever the student opens a chapter. Course authors should therefore endeavor to avoid lengthy chapters that would require extensive scrolling.

**Format and Appearance**

The editing toolbar will be familiar to anyone who has worked with Microsoft Office©. For a number of reasons (including ease of developing a printable PDF version of the course text), a course author may wish to develop content using MS Word and simply cut and paste the MS Word text into the authoring / editing dialog box. If this option is used, the author must use the “MS Word” icon on the editing toolbar to “clean” the MS Word text before attempting to add graphics or perform any other formatting task. This function removes ALL extraneous and MS Word coding from the text and helps to ensure a consistent look and feel for all course content. Use this function prior to doing any formatting in each section.
Although the editing toolbar offers options for changing the font typeface, font size, and font color, the FAASTeam strongly recommends use of the default settings in order to ensure a consistent look and feel for our online courses.

**Special Course Formats**

This is as good a place in these guidelines as any to explain a few exceptions or variations to the process of authoring courses. Namely, the use of special course formats such as:

- outside course material like DVD/CD courses
- those hosted by remotely sited on-line course servers
- Articulate® and ProForm® authoring program presentations

Each of these require special handling but are still easily used. It is important to note that when any of these type of media are used, an Introduction, Chapter 1, Review and course Exam are still required. The two major differences are that one of the chapters becomes a detailed explanation of how to obtain and use the special media. It will provide the user a link to the website where the course can be found and if appropriate, how to purchase the course. This explanation should include complete contact information for the course provider so any
questions about the course or how to obtain it can be answered appropriately by the provider of the course and not FAASafety.gov support staff.

The second difference in these unique situations that must be addressed is when pointing airmen back to appropriate sections or locations for course exam questions. On Articulate® presentations a specific slide(s) may be referenced. This becomes more difficult when trying to point to a specific place in a DVD/CD course or an on-line course segment produced in Flash.

NOTE: **ALL** original files used to produce Ariticulate®, ProForm® or other authoring tool non-commercial courses must be provided to the FAASTeam before a course using these authoring tools will be allowed to go live.

For additional directions and help with these special types of media formats please contact CourseSupport@FAASafety.gov.

*Additional Media*

Additional media uploaded in association with a given section (e.g., PDF files, illustrations, audio / video files) appear at the end of that section in the finished product. Course authors should be sure to assign appropriately descriptive names to files included in this section, and also to provide a concise description of content. The upload interface for related media is found at the bottom of each Course Section page as shown here.

The interface allows you to browse for the corresponding file on your computer and requires a description that will show up on the screen beside the link. It is important to be brief but give enough detail so the airmen will be able to see the added value in the material provided.

Note: The course author/manager is responsible to assure that any links to information are kept current and accurate during the entire time a course remains on FAASafety.gov.

Note: related media file names should not include any special characters such as “/ $ % & or *.”
Adding Graphics

The editing toolbar is also used to upload and place illustrative graphics in the course. To add a graphic, the course author must first be in the appropriate chapter and section of the course. Clicking the “photo” icon on the editing toolbar brings up a new dialog box for the Image Gallery.

A good first step is to create an image gallery folder for all images to be used in a specific course.

Scroll down to and select the new folder you just created for your course. Of course at this point the folder will be empty.

Use the “browse” and “upload” buttons to add the necessary photos, illustrations, or other graphics to the new image gallery folder.

You may find it easiest to upload all of the images you will need for a course all at one time. They will be available to you throughout your course development.
A few tips for using images in online courses are:

- Use PhotoShop© or another photo editing program to size and edit images before uploading them to the image gallery folder. The image gallery does allow for some minor resizing.

- Images should be sized to 72 dpi for use in online courses and, in PhotoShop©, should be saved using the “save for use in web application” option.

Use the image gallery “properties” dialog box to specify image alignment, to add a border, and to designate a title and alternate name (required for Section 508 compliance).

Always lock image ratio when resizing so as not to distort or disfigure the content of the image.

When you are finished making adjustments to your dimensions and properties click on the “Insert” button to insert the image into your chapter and section where your cursor is currently located.
Adding Exam Questions

All FAASafety.gov online courses are required to have an end of course exam.

**Note:** All exams on FAASafety.gov require a passing grade of 100%. Airmen are allowed to go back and retake each missed exam question as often as necessary to learn the correct answer.

A simple interface has been designed to facilitate adding questions to the course. Click on the "ADD EXAM QUESTION" link, as seen in the above example, to add an exam question. This will open the Course Exam Question screen.
The course author enters the question, specifies whether it is a mandatory (“required”) question, enters the answer choices, and specifies the correct answer. The interface also allows the course author to use the dropdown boxes to specify the chapter and section in which the material for the exam question is addressed. This is very helpful except where authoring tools like Ariticulate© or ProForm© are being used as the entire course would be located in Chapter 1 Section 1. We recommend in such cases that these selections are left blank so as not to confuse the student.

NOTE: at least two possible answers are required for each question. As the answers are randomized on a particular exam the use of "all of the above" or "A & B" etc. must not be used.

When a student takes the exam, the FAASafety.gov application will generate a unique test comprised of the number of questions specified in the Exam Size box. Exam questions that the course author designates as “required” will appear on each test, but the order in which both questions and possible answers will appear is different for each student.

Remember to "Save in Progress" often so your work will not be lost in the unlikely event of a system failure or power outage.

While we do not set a maximum number of questions asked or that can be entered into the bank of questions that might be asked for a particular course we do recommend the following minimums:

<table>
<thead>
<tr>
<th>Course Length</th>
<th>Total in Bank</th>
<th>Required</th>
<th>Exam Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 31 minutes</td>
<td>15</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>31 - 60 minutes</td>
<td>30</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>90 or more minutes</td>
<td>50</td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>
C. Establishing Course Credit

Located near the bottom of the primary course authoring/editing dialog box is a check box provided to indicate whether a course will have assigned credit for either the WINGS - Pilot Proficiency Program or AMT Awards Program. When checked, a dialog box opens to allow the course author an opportunity to indicate the Subject Areas covered, as well as Aircraft Categories and Classes and Airman Certificates for which the course is appropriate.

These selections will help an airman search for a particular course that covers their needs.

Only check those items that directly apply to the course content, aircraft, and airmen that it applies too.

The FAASTeam encourages all course providers to address the top accident causal factors in their course. These are indicated in color and placed first on the list of subject areas for convenience.

*WINGS - Pilot Proficiency Program - Course Credit*

At the top of the credit dialog box shown above you will notice the following link;

[Click here if you want to assign CREDIT to this activity.](#)

Clicking this link will open a search dialog box that allows the course author the ability to select the appropriate credit syllabus from the approved list of credits.

[Click to Add Syllabus]

You may enter a syllabus number, if known, or simply a keyword for the syllabus that will cover the type of course material that you are presenting in your course. For instance "weather" would yield the following list:
You may select the number of syllabi that are listed using the dropdown boxes available.

It is not within the scope of this publication to explain the WINGS - Pilot Proficiency Program credit structure. Questions of this type may be addressed through support at FAASafety.gov (support@FAASafety.gov). Once the course author determines the proper credit value for the course in question they can be selected here to add the credit to the course. This is done by simply clicking on the word “Select” to the left of the syllabus desired.

It is always a good idea to review the syllabus before selecting it for credit. This may be accomplished by simply clicking on the syllabus number. The course must comply with ALL of the listed requirements to qualify for the credit indicated by the syllabus.

NOTE: You may notice some syllabi with the same name but slightly different syllabus numbers. This is to accommodate courses on the same subject matter but for different levels of the program and for different credit values. Make sure you pick the correct syllabus that represents one that your course fulfills "all" of the requirements found therein.
Once selected, the syllabus and its corresponding credit value will be added to the course as shown in this example. Additional credit can be added as appropriate, keeping in mind that the course must comply with ALL requirements of each syllabus selected in its entirety.

Aviation Maintenance Technician (AMT) Awards Program - Course Credit

Assigning AMT course credit is done in the same manner as described above for the WINGS - Pilot Proficiency Program. Some courses may appropriately be accredited for both WINGS and AMT credit.

At the top of the credit dialog box shown above you will notice the following link;

C Clicking of this link will open a search dialog box that allows the course author the ability to select the appropriate credit syllabus from the approved list of credits.
You may enter a syllabus number, if known, or simply a keyword for the syllabus that will cover the type of course material that you are presenting in your course. For instance "AMT" would yield the following list:

<table>
<thead>
<tr>
<th>Actions</th>
<th>Syllabus Number</th>
<th>Syllabus Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-01</td>
<td>Aviation Maintenance Technician (AMT) Training – 1 hour</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-02</td>
<td>Aviation Maintenance Technician (AMT) Training – 2 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-03</td>
<td>Aviation Maintenance Technician (AMT) Training – 3 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-04</td>
<td>Aviation Maintenance Technician (AMT) Training – 4 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-05</td>
<td>Aviation Maintenance Technician (AMT) Training – 5 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-06</td>
<td>Aviation Maintenance Technician (AMT) Training – 6 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-07</td>
<td>Aviation Maintenance Technician (AMT) Training – 7 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-08</td>
<td>Aviation Maintenance Technician (AMT) Training – 8 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-09</td>
<td>Aviation Maintenance Technician (AMT) Training – 9 hours</td>
</tr>
<tr>
<td>Select</td>
<td>S-MT-M-001200-K-002-10</td>
<td>Aviation Maintenance Technician (AMT) Training – 10 hours</td>
</tr>
</tbody>
</table>

It is not within the scope of this publication to explain the ATM Awards Program. This information can be found in the “help” file under the maintenance hangar tab located on the home page at FAASafety.gov. ([http://faasafety.gov/AMT/amtinfo/AMTHelp.aspx](http://faasafety.gov/AMT/amtinfo/AMTHelp.aspx))

Once the course author determines the proper credit value for the course in question they can be selected here to add the credit to the course. This is done by simply clicking on the word “Select” to the left of the desired Syllabus. It is always a good idea to review the syllabus before selecting it for credit. This is done by clicking on the syllabus number.

### D. Review / Acceptance Process

Once the draft course is complete, the course author uses the primary course information page to select **Submit for Acceptance**. Policy divisions of the FAA, for example, AFS-800 or AFS-300, may be asked to review course material for content accuracy when appropriate. The FAASTeam will do a final review of the course, including associated graphics, files, and proposed credit hours, and accept or return the package. If accepted, the course will be added to the course catalog and the system will generate a notification to the course author. If the course is returned, the system will generate a form advising the course author of the reason for return. Authors should make any corrections noted and resubmit the course for acceptance.
NOTE: If you use any copyrighted material you must provide the copyright release with your submission. Send release to CourseSupport@FAASafety.gov clearly identifying the course(s) the material will be used in.

Also remember that ALL original files used to produce a non-commercial course much be submitted to the FAASTeam before a course will be approved.

E. Course Maintenance

The FAASTeam is committed to keeping all courses fresh and up-to-date. To this end, requirements include that authors will periodically review their course and will monitor course feedback.

Periodic Review

Each course author must review his or her courses -- including all chapters, sections, links, graphics, related files, and exam questions -- at least once every 6 months. The FAASTeam will limit the number of people with permission to take courses offline or modify “live” courses. Where updates are required the course author must develop a list of required changes for coordination with the FAASTeam. These corrections or modifications should be sent to: CourseSupport@FAASafety.gov