

AGRICULTURAL SYSTEMS MANAGEMENT (ASM)  
ASM 234: **Additive Manufacturing (3D Printing)**

Class Information:

Credit – 2  
Fall 2023  
Class Room: Ladd Hall Rm . 201  
Time: 8:30 - 9:20 pm T and TH

Instructor:

Matt Olhoft  
Ladd Hall 104H  
Phone: 701-231-7269  
E-mail: matthew.olhoft@ndsu.edu

Office Hours: By appointment or drop in. Usually available Tuesdays and Thursdays 8-5.

**Bulletin Description:** Overview of additive manufacturing and 3D printing. Will have hands on printing projects and lecture about industry use of additive manufacturing.

**Course Description:** 3D or Additive Manufacturing is quickly taking over the more traditional ways of making things through subtractive manufacturing methods. 3D printing is making more and more of the proto types, parts, and products we use everyday in a quicker, more responsible way. This course will explore how 3D printing started, generative design, how to 3D print, and how is it currently being used in industry. Students in this class will utilize 3D printers, scanners, and laser cutters to gain hands on experience in the world of 3D manufacturing and tour local 3D companies to see real life manufacturing in progress.

**TEXT:** There is no text for this course, so show up for class and get your notes.

**COURSE OBJECTIVES:**

1. To develop an introductory understanding of additive manufacturing and 3D printing.
2. To develop good problem solving skills and to learn how use additive manufacturing methods as solutions to problems.
3. To apply 3D printing and create prints.

**REQUIRED RESOURCES:** Text book, non-spiral letter size paper for homework, pencil, eraser, basic calculator, DOS based laptop computer is helpful

**BLACKBOARD:** Blackboard will be used for announcements, class presentations, assignments, and temporary grades presentation

**GRADING**

<u>Items</u>		Total Points
Tests	(mid-term test, final test, each@100 pt.)	200
Home work	(3 projects, 50 pts. each)	150

Report

(1 report about Additive Manufacturing, 50 pts.)

50

**Total pts: 400**

(There may be extra credits for students in addition to the formal grading. So the total grade points can be more than 400).

The cut off for letter grades: 100-90.00% = A; 89.99-80.00% = B; 79.99-70.00% = C;  
69.99-60.00% = D; 59.99% or lower = F

(Students are encouraged to work projects together. Working together can be a good learning experience. But the solution and submission of home work projects should be individual. )

#### **Exams and quizzes policies:**

Students are expected to take the tests at the appointed time and date unless other arrangements are made with the instructor. The tests will be combinations of types of questions, which may include short answer, problems, multiple choice, and fill in the blank questions, depending on what works best for the material covered. Quizzes may be given throughout the semester and may be either announced or unannounced. There are no make-ups for quizzes or tests, except in medical, family emergencies, or interview cases. Missed tests, exams, and quizzes will receive zero points unless missed for an acceptable reason and with advance notification where possible. The final exam will be comprehensive. Marks will be deducted if steps are not shown in word problem(s) in the test(s).

#### **MISSING HOMEWORK ASSIGNMENTS**

Homework is an important learning tool and assessment for you. It helps to understand the concepts discussed in class and it helps to develop good problem solving skills, which will be important in later courses and in professional life. You are expected to complete all homework assignments and hand them in for grading on time. Homework will be collected at the beginning of class. **No late submissions of Homework are accepted for full credit.**

#### **MISSING CLASSES**

You are expected to attend all class periods but there is no roll-call. If a class is missed, contact the instructor or class mates for notes. The PowerPoint presentations will be posted in the blackboard.

***If you are unable to attend the class, let the instructor know ahead of time by e-mail or other written formats.***

#### **IMPORTANT NOTIFICATION**

**Academic Honesty:** All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (<http://www.ag.ndsu.edu/academics/honor-system-1>). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work best when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.

The academic community is operated on the basis of honesty, integrity, and fair play. [NDSU Policy 335: Code of Academic Responsibility and Conduct](#) applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the [Office of Registration and Records](#). Informational resources about academic honesty for students and instructional staff members can be found at [www.ndsu.edu/academichonesty](http://www.ndsu.edu/academichonesty).

**Students with special requirements:** Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in Wallman Wellness Center 170 (231-8463). <http://www.ndsu.edu/disabilityservices/>.  
**Veterans and military personnel:** Veterans or military personnel with special circumstances or who are activated are encouraged to notify the instructor as early as possible.

### **Well-being Resources on Campus and in the Community**

As a member of the NDSU community, resources are available for you should you need help in dealing with adverse reactions to things happening in the world today. A variety of resources are listed below:

For students on campus and remotely (telehealth):

Counseling Services: 701-231-7671

Disability Services: 701-231-8463

Student Health Service: 701-231-7331

In a crisis or emergency situation:

Call University Police: 701-231-8998

Call 911

Go to a Hospital Emergency Room

Go to Prairie St. Johns for a Needs Assessment: 701-476-721 (510 4th St. S.)

Call the FirstLink Help Line: 1-800-273- TALK (8255) or 2-1-1

Call Rape and Abuse Crisis Center: 701-293-7273

### ***Important Dates***

Aug 21      Mon      Classes begin at 4:00 p.m.

Aug 22      Tue      First full day of classes

Aug 28	Mon	Last day to be added to Campus Connection <a href="#">Wait Lists</a>
Aug 30	Wed	Last day to <a href="#">Add</a> classes via <a href="#">Campus Connection</a> * Permit needed after this date.
Aug 30	Wed	Last day for no-record <a href="#">Drop</a> of classes @ 100% refund* ( <i>full semester classes only</i> )
Aug 30	Wed	Last day to <a href="#">Withdraw to Zero Credits</a> @ 100% refund* ( <i>full semester classes only</i> )
Aug 30	Wed	Attempted credits calculated for financial aid <a href="#">SAP</a> (11:59 p.m.)
Aug 30	Wed	Eligible Pell/TEACH/ND Grants/Scholarships based on enrollment at 11:59 p.m.
Sep 4	Mon	<b>HOLIDAY</b> — Labor Day ( <i>no classes, offices closed</i> )
Sep 5	Tue	Financial aid applied to NDSU account balances
Sep 6	Wed	Payments due for NDSU account balances
Sep 8	Fri	Last day to submit ND Resident Student Status Application for Fall 2023
Sep 11	Mon	Last day to submit requests to Audit, <a href="#">Pass/Fail</a>
Sep 18	Mon	Enrollment Census
Sep 29	Fri	Last day to <a href="#">Withdraw to Zero Credits</a> @ 75% refund* ( <i>full semester classes only</i> ).
Oct (First Week)		Spring/Summer registration schedule available
Oct (Second Week)		Spring/Summer <a href="#">registration appointment times</a> available
Oct 13	Fri	Grades of 'Incomplete' convert to 'F'

Oct 15	Sun	Late fees applied to unpaid account balances (11:59 p.m.)
Oct 16	Mon	Undergraduate/Professional Fall <a href="#">Graduation Applications</a> due
Oct 16	Mon	Graduate student <a href="#">Intent to Graduate</a> survey
Oct 16	Mon	2nd half (8-week session) of Fall semester begins
Oct 26	Thu	Spring/Summer registration begins online based on total credits completed
Oct 29	Sun	Last day to <a href="#">Withdraw to Zero Credits</a> @ 50% refund* ( <i>full semester classes only</i> ). <b>No refunds issued for withdraw to zero credits after this date.</b>
Nov 9	Thu	Last day to <a href="#">Drop</a> classes with 'W' record
Nov 9	Thu	Last day to <a href="#">Withdraw to Zero Credits</a> for Fall
Nov 10	Fri	<b>HOLIDAY</b> — Veterans Day Observed ( <i>no classes, offices closed</i> )
Nov 15	Wed	Late fees applied to unpaid account balances (11:59 p.m.)
Nov 15	Wed	Graduate student <a href="#">Oral Defense Deadline</a>
Nov 17	Fri	Fall Commencement Participation deadline
Nov 17	Fri	Graduate student <a href="#">Post-Defense Submission for Format Review</a>
Nov 20	Mon	Registration Appointment times no longer needed for spring
Nov 22-24	Wed-Fri	<b>HOLIDAY</b> — Thanksgiving ( <i>no classes; offices closed Thursday, offices open Wednesday &amp; Friday</i> )
Dec 4-8	Mon-Fri	<a href="#">Dead Week</a>
Dec 5	Tue	Grade entry begins

Dec 8	Fri	Last day of Fall classes
Dec 11-15	Mon-Fri	<u>Final Examinations</u>
Dec 15	Fri	Late fees applied to unpaid account balances (11:59 p.m.)
Dec 15	Fri	Graduate student <u>Final Degree Clearance Deadline</u>
Dec 15	Fri	<u>Graduation Application</u> and <u>fee</u> (Certificate and Plan C Students).
Dec 15	Fri	<u>Commencement</u> ceremony (2:00 p.m. and 5:00 p.m. in Sanford Health Athletic Complex)

**GENERAL CLASS SCHEDULE** (subject to change)

Period	Date	Topic	Unit
1	Aug. 22	Introduction Additive Manufacturing-History	
2	24, 31	History-Types of 3D printing	
3	Sept. 5, 7	Materials for 3D printing	
4	12, 14	Tour FAME 3D (Lulzbot)	
5	19, 21	Generative Design	
6	26, 28	Steps to 3D printing	
7	Oct. 3, 5	Thingiverse, Tinker CAD	
8	10, 12	Cura and slicing and Midterm test	
9	17, 19	3D printing	
10	24, 26	Glowforge and Plasma CAM	
11	31, Nov. 2	Glowforge cutting	
12	7, 9	Tour 3D Fuel	
13	14, 16	Scanning	
14	21, 23	Scanning print	
15	28, 30	Printing scanned print	
16	Dec. 5,7	Tour CNH rapid prototyping	
17		Concrete 3D printing	
18	15	Final test	

**THE DATE FOR FINAL EXAM IS, 15<sup>TH</sup> DECEMBER, 2023 10:30 AM**