

# Route Geometrics & Design – SUR 4201

## 1 Overview

The geometric design of transportation systems, computer applications and a comprehensive design project. Spiral curves, super-elevation theory and earthwork analysis are covered.

- 3 Credits
- Fall Semester
- Format: Hybrid: a mix of Live and Recorded lectures, Online assignments, and Quizzes.
- <http://elearning.ufl.edu/>
- Virtual Office Hours via Zoom: Wednesdays 10:40a – 11:30a or by appointment: <https://ufl.zoom.us/my/jthomas88>

**Course Prerequisites:** none

**Minimum Technical Skills required:**

- 1) Using the learning management system ([elearning.ufl.edu](http://elearning.ufl.edu))
- 2) Using email with attachments
- 3) Creating and submitting files in commonly used word processing program formats
- 4) Using spreadsheet programs

**Instructor:** Justin Thomas (Phone: 352.392.4996; Email: [jthomas88@ufl.edu](mailto:jthomas88@ufl.edu), Office: 301 Reed Lab [Main Campus])

- Please use gatorlink email ([jthomas88@ufl.edu](mailto:jthomas88@ufl.edu)) for fastest response and be sure to start the subject with SUR4201. Responses will be provided within 24hrs of receiving the message if not sooner.

**Required textbook(s) and/or readings:** None. Utilize online resources via Canvas and The Florida “Greenbook” and other useful references can be found at:

<http://www.dot.state.fl.us/rddesign/CS/CS.shtm>

**Recommended Texts:** “Elementary Surveying – An Introduction to Geomatics” by Wolf and Ghilani (10<sup>th</sup> edition or later: 15<sup>th</sup> is the current one and is listed as Ghilani and Wolf)

## 2 Learning Outcomes

The course objectives are to provide students with (1) the theoretical foundation of Basic Surveying Fundamentals, Vertical and Horizontal Route Alignments, Spirals, Super Elevation, Earth Work, and Volumetric Analysis, (2) practical skills to apply these foundations in Right of Way Mapping and working with different Departments of Transportation around the country, (3) measures involved in creating a roadway at the different stages during the design process, (4) basics of Design Standards, Projects and Plans as it relates to the Florida Department of Transportation.

At the completion of the course, the student should be able to:

- Demonstrate the ability to produce coordinates from a transformed field traverse
- Design the horizontal and vertical elements of a roadway alignment with and without Superelevation
- Plan and implement Horizontal Spiral Curves into an existing roadway project.
- Evaluate the amount of Cut and/or Fill that would be required for a given project.
- Prepare an Earth work cost analysis
- Evaluate roadway conditions to verify that they meet current design standards for a safe roadway

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<sup>1</sup>Zoom is a software program used to conduct virtual meetings. See “Using Zoom Software” section of the syllabus.

### 3 Course Logistics

This is an online course and there will be elements that students must utilize to be successful. Students may access lectures, supporting materials, quizzes and homework assignments as they become available each week.

Learning modules consist of recorded lecture videos, supporting material, homework assignments and quizzes are provided online for each topic.

There are no mandatory laboratory sessions. Any needs that arise outside of office hours, sessions will be scheduled with the instructor and/or conducted in Zoom as needed. Support is also available by phone or by email. In the past, students have typically found that communication by email is a flexible way to work through assignment issues.

#### Technology Requirements:

- A computer or mobile device with high-speed internet connection.
- Access to Microsoft Excel (see Using Excel) & Microsoft Word
- A headset and/or microphone and speakers; a web cam is required for quizzes.
- Latest version of web browser. Canvas supports only the two most recent versions of any given browser. [What browser am I using?](#)
- Zoom: <https://ufl.zoom.us/my/jthomas88> is accessible through a pop-up in a chrome browser, but may also run through other browsers, though further installation may be needed.

#### Using Zoom Software

Office hour meetings (per request) will be conducted using Zoom web conferencing software. The software is accessed by clicking the link provided by the instructor via the eLearning course site. The instructor will schedule and post sessions and their links. Click the provided link to access the office hour session.

The eLearning site provides information about participating in Zoom meetings and sessions. Zoom requires internet connection and a web browser. A microphone, speakers, and a webcam are recommended for participation in office hours to capitalize on the full communication functionality of Zoom. Zoom supports almost all operating systems, including Windows, Macintosh, and Linux. Most widely used browsers are also supported, including Internet Explorer, Firefox, Safari, and Chrome. Zoom is compatible with iOS, Android, Blackberry and Surface Pro devices. Visit the [“Getting Started”](#) link to see other connections and trouble shooting. See Zoom’s Privacy Policy here: <https://zoom.us/privacy>

#### Using Excel and other software

In order to effectively complete the homework assignments, you will need to utilize Microsoft Excel and Word or a Similar Spreadsheet/ Word Processing Software. As a student at the University of Florida, you have access Microsoft Office if you don’t already have it installed. You have 2 options:

- 1) Utilize UF Apps (<https://info.apps.ufl.edu/>). Note you will need to log in using your Gatorlink username [xxxxxxx@ufl.edu] and your gatorlink password.
- 2) As a student you have access to download Microsoft Office. You will need to use your Gatorlink ID and Password in order to gain access (<https://it.ufl.edu/services/gatorcloud-microsoft-office-online>).

For assistance in using Excel, searching online (Google, Youtube, etc.) is a very valuable resource. Also, using microsoft’s help forum is a great resource (<https://support.microsoft.com/en-us/excel>). For learners who have disabilities, please see Microsoft’s Accessibility statement and the associated tools (<https://www.microsoft.com/en-us/accessibility>)

For more information on the data that Microsoft collects and to insure you understand your privacy, see Microsoft’s Privacy Policy Here: <https://privacy.microsoft.com/en-us/privacystatement>

## 3.1 Assignments & Deliverables\*

### Participation

Class participation is encouraged. Discussions and questions can take place with the instructor during scheduled office hours or via phone or email. Discussion can also take place on the eLearning course site's message boards. While attendance is not mandatory during the class period, participation provides a better learning experience if you share your thoughts, ask questions and post in the discussion boards. There is not a grade associated with participation, but participation will be utilized in determining final grades.

### Quizzes

There will be 8 quizzes presented during the semester, worth 40 points each. All quizzes will be available on Canvas from 8:00 AM to 11:59 PM on the day after a homework assignment is to be turned in. Quizzes will assess mastery of material in the homework, but cumulative skills may be needed due to the nature of the course content. **There are no provisions for making up a missed quiz.** Exceptions will be made only for extenuating circumstances. A missed quiz will result in a score of zero, and each quiz can be taken only once. To accommodate a potential missed quiz, the lowest quiz score will be replaced by the final exam grade. Please note that all quizzes will be closed notes and are to be completed individually. Scores and feedback will be provided within 3 days of the quiz being submitted. Be sure to review the quiz after it has been graded for correct answers and feedback on incorrect solutions.

Due to the grade-weight of each quiz, the utilization of HonorLock, online quiz proctoring, must be implemented. See [Honorlock – Student Exam Preparation Information](#) for details on what to expect. Please familiarize yourself with the system before quiz day.

Honorlock will proctor your quizzes this semester. Honorlock is an online proctoring service that allows you to take your quiz from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.

To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at [www.honorlock.com/extension/install](http://www.honorlock.com/extension/install). When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your quiz session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.

### Homework Assignments

There will be 8 homework exercises presented during the semester, worth 25 points each. If you submit them for grading, they must be complete solutions. Each homework assignment deliverable must include an excel file, .pdf, and/or project feedback as specified in the assignment instructions. Refer to the included schedule for due dates. The instructor reserves the right to modify the schedule if necessary. Any modifications will be announced through the eLearning course site. All homework projects are to be completed **individually**. Assignments must be submitted by the deadline. The late policy is a 5% deduction/per day after the assigned due date up to 7 days late. There is no provision for a missed homework assignment aside from receiving a 0. Homework assignments will be graded according to the rubric established for each assignment. I will provide grades and feedback within 7 days of submission.

Submitted files for homework assignments should conform to the following naming convention: Course Prefix & Number – HW# - Student Last Name – First Initial (for example: **SUR4201-HW2-Thomas-J.XXX**). Additional submission instructions will be included in each homework assignment.

### Exam\*

The final exam for this course is scheduled as an in-person, 120-minute exams that can be taken from **3:00 PM to 5:00 PM**. The instructor reserves the right to modify the schedule if necessary. The Final Exam will be 120 minutes and by UF policy it is scheduled for **December 13th** and available to take from **3:00 PM to 5:00 PM**. Due to the grade-weight of the exam, the utilization of HonorLock, online exam proctoring, may be implemented. See [Honorlock – Student Exam Preparation Information](#) for details on what to expect. Please familiarize yourself with the system before exam day.

Honorlock may proctor your exams this semester. Honorlock is an online proctoring service that allows you to take your exam from the comfort of your home. You DO NOT need to create an account, download software or schedule an appointment in advance. Honorlock is available 24/7 and all that is needed is a computer, a working webcam, and a stable Internet connection.

To get started, you will need Google Chrome and to download the Honorlock Chrome Extension. You can download the extension at [www.honorlock.com/extension/install](http://www.honorlock.com/extension/install). When you are ready to test, log into Canvas, go to your course, and click on your exam. Clicking "Launch Proctoring" will begin the Honorlock authentication process, where you will take a picture of yourself, show your ID, and complete a scan of your room. Honorlock will be recording your exam session by webcam as well as recording your screen. Honorlock also has an integrity algorithm that can detect search-engine use, so please do not attempt to search for answers, even if it's on a secondary device.

- **Final Exam: December 13<sup>th</sup> from 3:00 PM to 5:00 PM**

\*Feedback on graded Items should be expected up to a week after the item was submitted.

### Final Project:

You will be tasked with finding a segment of road in whatever location you choose. You will study this segment of road and analyze it to one of the many topics covered this semester. You will need to create a 5 minute presentation, a research paper communicating your findings and complete peer evaluations of 5 different presentations. There will be more details on the final project given later in the semester.

## 3.2 Grades & Grading Scale

Grading Item	Points	Description
Introductions	5 Extra Credit Points	See Class Introductions in "Discussions"
Quizzes	8 @40 points (320 points total)	8 Online quizzes. See "Quizzes" section. Lowest quiz grade replaced by Final Exam percentage grade.
Homeworks	8 @ 25 points (200 points total)	8 homework assignments. See "Assignments" section
Final Exam	Final Exam: 150 points	<b>December 13<sup>th</sup></b> : Final Exam
Final Project	(Paper + Presentation + Student Evaluations) = 150 points	Presentation: 70 Points Paper: 50 Points Peer Evaluations: 30 points
Total	820	Total Possible Points

The final grade will be calculated by dividing the number of cumulative points received by the total possible points. The instructor reserves the right to modify the grading scheme as necessary. Individual assignments, quizzes, and exams will not be curved. Grades may or may not be curved at the end of the semester. Final grades are based on the +/- grading scale used at UF. For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.

Letter Grade	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
Corresponding Course Score	93	90	88	83	80	78	73	70	68	63	60	0-59
Grade Points	4	3.67	3.33	3	2.67	2.33	2	1.67	1.33	1	0.67	0

## 4 Course Content

### Order of Learning Topics and Exams

Lec.	Topic	Reading assignment
1	Course Intro & Overview of Route Design	
2	Angles, Azimuths, Bearings	Elementary Surveying: Chap 7
3-4	Traverse	Elementary Surveying: Chap 9
5-7	Traverse Adjustment	Elementary Surveying: Chap 10
8	State Plane Coordinates	Browse Elementary Surveying: Chap 20
9	Horizontal Alignments and Curves	Elementary Surveying: Chap 24
10-11	Horizontal Route Design Calculations	
12	Profiles and Vertical Route Tangents	Browse Elementary Surveying: Chap 25
13	Vertical Curves	Elementary Surveying: Chap 25
14-15	Vertical Alignment Design	
16	Cross Sections - 1	Browse Elementary Surveying: Chap 26
17	Cross Sections - 2	
18	End Areas and Volumes	Elementary Surveying: Chap 26
19	Surface Models, DEM and TIN	
20	Intro to Spirals	
21	Spiral Computations	Elementary Surveying: Chap 24
22-24	Spiral Design	
25	Intro to Super-Elevation	
26	Super-Elevation Design Standards	
27-28	Super-Elevation Transitions	
29-31	Earthwork Analysis –Mass Diagram	
32-34	Geometric Design Standards	
35	Route Project Time Line	Florida Green Book – Chap. 3
36	Review of Plans	

## Schedule for Module Content, Assignments, Quizzes and Final Exam.

Monday	Tuesday	Wednesday	Thursday	Friday
8/22	8/23	8/24 <b>First Day of Fall Semester</b> Lecture 1	8/25	8/26 Lecture 2
8/29 Lecture 3	8/30	8/31 Lecture 4	9/01	9/02 Lecture 5
9/05 <b>Labor Day – No Class</b>	9/06	9/07 Lecture 6	9/08	9/09 Lecture 7
9/12 <b>Lecture 8</b>	9/13	9/14 Lecture 9	9/15	9/16 Lecture 10
9/19 Lecture 11 <i>Assignment 1 Due</i>	9/20	9/21 Lecture 12 <i>Quiz 1 Due</i>	9/22	9/23 Lecture 13
9/26 Lecture 14 <i>Assignment 2 Due</i>	9/27	9/28 Lecture 15 <i>Quiz 2 Due</i>	9/29	9/30 Lecture 16
10/03 Lecture 17	10/04	10/05 Lecture 18 <i>Assignment 3 Due</i>	10/06	10/07 <b>UF Homecoming No Class</b>
10/10 Lecture 19 <i>Quiz 3 Due</i>	10/11	10/12 Lecture 20	10/13	10/14 Lecture 21 <i>Assignment 4 Due</i>
10/17 Lecture 22 <i>Quiz 4 Due</i>	10/18	10/19 Lecture 23	10/20	10/21 Lecture 24
10/24 Lecture 25	10/25	10/26 Lecture 26	10/27	10/28 Lecture 27 <i>Assignment 5 Due</i>
10/31 Lecture 28 <i>Quiz 5 Due</i>	11/01	11/02 Lecture 29	11/03	11/04 Lecture 30
11/07 Lecture 31 <i>Assignment 6 Due</i>	11/08	11/09 Lecture 32 <i>Quiz 6 Due</i>	11/10	11/11 <b>Veteran's Day No Class</b>
11/14 Lecture 33	11/15	11/16 Lecture 34 <i>Assignment 7 Due</i>	11/17	11/18 Lecture 35 – Final Project Introduction <i>Quiz 7 Due</i>
11/21 Lecture 36 Work Day	11/22	11/23 <b>Thanksgiving Break No Class</b>	11/24 <b>Thanksgiving Break No Class</b>	11/25 <b>Thanksgiving Break No Class</b>
11/28 Work Day <i>Assignment 8 Due</i>	11/29	11/30 Work Day <i>Quiz 8 Due</i>	12/01	12/02 Work Day
12/05 Work Day	12/06	12/07 <b>Last day of Semester</b>	12/08 <b>Reading Day</b>	12/09 <b>Reading Day</b>
12/12	12/13 <b>Final Exam: 3p-5p</b>	12/14	12/15	12/16

## 5 Policies and Requirements

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

### 5.1 Late Submissions & Make-up Requests

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course.

Late submissions will not be accepted except for under extenuating circumstances. Examples of extenuating circumstances can be found at

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352-392-4357 (option 2).

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

### 5.2 Semester Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning.

**At approximately the mid-point of the semester**, the School of Forest, Fisheries and Geomatics Sciences will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required, but encouraged. This is not the UF Faculty Evaluation!

**At the end of the semester**, students are expected to provide UF with feedback on the quality of instruction in this course using a standard set of university and college criteria (UF Faculty Evaluations). These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

**Anytime Feedback**, As much as students are held to a high standard on their performance in this class, I hold myself to a high standard. I encourage feedback from students as to how things can be improved. It is very important for you as the student to let me know if things can get better in this class. I am very open to feedback at anytime in the course. Whether by email, phone call or “in person...on zoom”. Feedback is crucial to the adaptation and growth of this course.

## 5.3 Netiquette: Communication Courtesy and Professionalism

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office. [Netiquette Guidelines](#)

Prepare emails as you would in a professional setting. Start emails with an appropriate subject line, including the course number (SUR 4201) followed by the subject of the email. Emails are typically responded to within a business day. Please try to avoid last minute emails as I may be unable to respond before a homework, quiz, or exam deadline.

Just as in any professional environment, meaningful and constructive dialogue is expected in this class and requires a degree of mutual respect, willingness to listen, and tolerance of opposing points of view. **Respect for individual differences and alternative viewpoints will be maintained in this class at all times.** All members of the class are expected to follow rules of common courtesy, decency, and civility in all interactions. Failure to do so will not be tolerated and may result in loss of participation points and/or referral to the Dean of Students' Office.

## 5.4 Academic Honesty Policy

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."*

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either **required or implied**: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that **you will complete all work independently** unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct or appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated.

Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see:

<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Homework submissions for this course may not be copied in part or in whole. While students are allowed to discuss concepts from the assignments with other students, all work must be independently produced.

**This policy, along with the principles of the Student Honor Code, will be vigorously upheld at all times in this course.**

## 5.5 University Policy on Accommodating Students with Disabilities:

Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.



## 5.6 Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

## 5.7 In-Class Recording Policy

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student

# 6 Getting Help

For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at:

- [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu) | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

## 6.1 Student Life, Wellness, and Counseling Help

- *U Matter, We Care*: If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center*: [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center*: Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).
- *University Police Department*: [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).

- *UF Health Shands Emergency Room / Trauma Center*: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).
- *GatorWell Health Promotion Services*: For prevention services focused on optimal wellbeing, including Wellness Coaching for Academic Success, visit the [GatorWell website](#) or call 352-273-4450.

## 6.2 Student Complaint Process

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all of our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- Students in online courses: <http://www.distance.ufl.edu/student-complaint-process>
- Students in face-to-face courses: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf)