

MEMORANDUM TO: Ogden College of Science and Engineering Curriculum Committee

Dr. Melanie Autin
Dr. Simran Banga
Dr. Royhan Gani
Dr. Becky Gilfillen
Dr. Ting-Hui Lee

Dr. Andy Mienaltowski
Dr. Hope Marchionda
Dr. Zhonghang Xia
Dr. Bangbo Yan

FROM: Dr. Stuart Burris, Chair

SUBJECT: Agenda for Thursday, October 1, 2026

A. OLD BUSINESS:

- I. Consideration of the minutes of the September 2026 meeting.

B. NEW BUSINESS:

Type of item	Description of Item & Contact Information
Informational	<u>The following items were sent through the expedited process</u> METR 324 – Pre-req update
Action	Proposal to Change a Program Ref. 578: Meteorology, Bachelor of Science Contact: Greg Goodrich, Gregory.goodrich@wku.edu , 2703203897
Action	Proposal to Create a New Course SMRT 300: IIoT Networks and Systems Contact: Gregory Arbuckle, greg.arbuckle@wku.edu , x2403
Action	Proposal to Create a New Course SMRT 325: IIoT Data Acquisition, Fusion, and Storage Contact: Gregory Arbuckle, greg.arbuckle@wku.edu , x2403
Action	Proposal to Create a New Course SMRT 350: IIoT Data Modeling and Analysis Contact: Gregory Arbuckle, greg.arbuckle@wku.edu , x2403
Action	Proposal to Create a New Course SMRT 490: Senior Research for Smart Manufacturing Contact: Bryan Reaka, bryan.reaka@wku.edu , x7032
Action	Proposal to Change a Program Ref. 5007: Engineering Technology Management, Bachelor of Science Contact: Gregory Arbuckle, greg.arbuckle@wku.edu , x2403

C. OTHER BUSINESS

Minutes – OCSE Curriculum Committee

September 2026

Members Present:

The September 2026 meeting was conducted over email.

FROM: Dr. Stuart Burris, Chair

OLD BUSINESS:

Minutes from the April 2026 meeting were approved as posted.

NEW BUSINESS:

Action Agenda:

Proposal to Make Revisions to a Course – ANSC 321 – approved.

Other Business:

None

Program Change Request

Date Submitted: 08/21/26 3:56 pm

Viewing: **578 : Meteorology, Bachelor of Science**

Last approved: 06/17/26 2:55 pm

Last edit: 08/21/26 3:56 pm

Changes proposed by: grg07567

Catalog Pages
Using this Program
[Meteorology, Bachelor of Science \(578\)](#)

Proposed Action

In Workflow

- 1. GEO Approval
- 2. SC Dean
- 3. SC Curriculum Committee
- 4. Undergraduate Curriculum Committee
- 5. University Senate
- 6. Provost
- 7. Program Inventory

Approval Path

- 1. 08/19/26 11:55 am
Leslie North
(leslie.north):
Rollback to Initiator
- 2. 09/06/26 1:01 pm
Leslie North
(leslie.north):
Approved for GEO Approval
- 3. 09/28/26 10:49 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

History

- 1. May 26, 2021 by
Rheanna Plemons
(rheanna.plemons)
- 2. Sep 27, 2021 by
Jennifer Hammonds
(jennifer.hammonds)
- 3. Feb 27, 2023 by
Gregory Goodrich
(gregory.goodrich)
- 4. Jul 6, 2023 by Ryan
Wilson (ryan.wilson)

5. Apr 3, 2025 by
Gregory Goodrich
(gregory.goodrich)
6. Oct 16, 2025 by
zch82449
7. Jun 17, 2026 by
Ryan Wilson
(ryan.wilson)

Active

Contact Person

Name	Email	Phone
Greg Goodrich	gregory.goodrich@wku.edu	270-320-3897

Term of Implementation 2027-2028

Program Reference Number 578

Review Type Full Review

Academic Level Undergraduate

Program Type Major

Degree Types Bachelor of Science

Department Geography & Geology

College Science and Engineering

Program Name (eg. Biology) Meteorology, Bachelor of Science

Will this program have concentrations?
No

CIP Code 40.0404 - Meteorology.

Will this program lead to teacher certification? No

Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements

No

Catalog Content

Program Overview (Catalog field: Overview tab)

The B.S. in Meteorology degree at WKU is the first and largest meteorology program in Kentucky or Tennessee that meets all the Federal Civil Service requirements (GS-1340) for employment by the National Weather Service and enables TV broadcast meteorologists to immediately pursue the "Certified Broadcast Meteorologist" program of the American Meteorological Society upon graduation. In addition to preparing students for immediate employment as meteorologists, the combination of advanced theoretical and applied coursework as well as experience with meteorological instrumentation and computer programming will provide a foundation for students who wish to pursue graduate school in the atmospheric sciences. Students will become more directly involved in faculty-sponsored research, increased co-authorship of peer-reviewed research articles, and increased presentation of research results at professional meetings and conferences. Students will also have the opportunity to work for White Squirrel Weather (WSWX), which acts as the WKU weather service, where students make weather observations and weather forecasts to provide decision support to a variety of WKU entities, including WKU Athletics, Environmental Health and Safety, and WKU Admissions.

Curriculum Requirements (Catalog field: Program Requirements)

Program Requirements (50 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/
Last Approved: May 21, 2026 2:57pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php.
Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

The major in Meteorology leads to a Bachelor of Science in Meteorology and requires a minimum of 50 semester hours of meteorology, geography, GIS, and computer science. A minor program is not required. Other required courses in physics and mathematics total an additional 25 semester hours. Students majoring in meteorology will learn the key concepts and skills necessary to qualify as a meteorologist for the National Weather Service, and to meet the standards of the American Meteorological Society.

Required Courses

METR 121	Meteorology	3
METR 122	Aviation Meteorology	3
CS 170	Problem Solving and Programming	3
GEOG 300	Writing in the Geosciences	3
GISC 316	Geographic Information Systems I	4
METR 324	Weather Analysis and Forecasting	3
GEOG 391	Geoscience Statistical Analysis	4
or STAT 301	Introductory Probability and Applied Statistics	
METR 431	Dynamic Meteorology I	3
METR 432	Synoptic Meteorology	3

<u>METR 433</u>	Dynamic Meteorology II	3
<u>METR 437</u>	Mesoscale Meteorology	3
<u>METR 438</u>	Physical Meteorology	3
Meteorology Technique Course		
<u>METR 325</u>	Meteorological Instrumentation and Measurement	3
or <u>METR 335</u>	Satellite/Radar Meteorology	
Total Hours		41

In addition to the required courses, select 9 hours from any 200-level or above METR course

Suggested courses include:		9
<u>METR 322</u>	Global Climate Systems	
<u>METR 325</u>	Meteorological Instrumentation and Measurement	
<u>METR 326</u>	Applied Meteorology / Climatology	
<u>METR 335</u>	Satellite/Radar Meteorology	
<u>METR 422</u>	Physical Climatology	
<u>METR 425</u>	Field Methods in Severe Weather Analysis and Forecasting	
<u>METR 430</u>	Meteorological Computing	
<u>METR 439</u>	Atmospheric Modeling	
<u>METR 460</u>	Climate Teleconnections	
<u>METR 475</u>	Selected Topics in Meteorology	
Total Hours		9

Additional Courses Required Outside of the Major

<u>PHYS 255</u> & <u>PHYS 256</u>	University Physics I and University Physics I Lab	5
<u>PHYS 265</u> & <u>PHYS 266</u>	University Physics II and University Physics II Laboratory	5
<u>MATH 136</u>	Calculus I	4
<u>MATH 137</u>	Calculus II	4
<u>MATH 237</u>	Multivariable Calculus	4
<u>MATH 331</u>	Differential Equations	3
Total Hours		25

4-Year Plan

Finish in Four Plan

First Year

Fall	Hours	Spring	Hours
METR 121	3	MATH 137	4
ENG 100	3	METR 122	3
MATH 136	4	HIST 101 or HIST 102	3
Colonnade - Social & Behavioral	3	COMM 145	3
GEOG 175	2	General Elective	3
	15		16

Second Year

Fall	Hours	Spring	Hours
MATH 237	4	MATH 331	3
METR Elective	3	METR 324	3
GISC 316	4	World Language or General Elective	3
Colonnade - Arts & Humanities	3	ENG 200	3
		CS 170	3
	14		15

Third Year

Fall	Hours	Spring	Hours
METR 431	3	METR 433	3
GEOG 300	3	Colonnade - Connections	3
METR 335 (or METR Elective)	3	METR 438	3
PHYS 255	5	PHYS 265	5
& PHYS 256		& PHYS 266	
General Elective	3		
	17		14

Fourth Year

Fall	Hours	Spring	Hours
METR 432	3	METR 437	3
Colonnade - Connections	3	METR 325 (or METR Elective)	3
METR Elective or Independent Research	3	GEOG 391 or STAT 301	4
General Elective	3	Colonnade - Connections	3
General Elective	3	General Elective	1
	15		14

Total Hours 120

120 Hours total are required in the program, with 42 hours at the 300/400 level.

Summer courses, including Study Abroad, Field Camps, and other independent research opportunities, can reduce the number of hours required in the regular semesters.

Any of the courses can be moved from semester to semester to take advantage of courses when offered.

The WKU Colonnade Program requires a minimum of 39 hours, with several required courses in the Geography program that can be double-counted. METR/GEOG courses marked * count for Colonnade Credit.

Colonnade Connections courses are restricted to Juniors/Seniors, unless 21 credit hours of Colonnade Explorations and Foundations courses have already been completed. Three disciplines are required for Connections credit (METR, GEOG, GEOL, and GISC count as separate disciplines).

REQUIRED IN THE MAJOR ([50](#) ~~48~~ hours): **CORE COURSES** = METR 121*, 122, CS 170, GEOG 300*, 391, GISC 316, METR 324, 431, 432, 433, 437, [438](#), and [325 OR 335](#) ([41](#) ~~438~~ ~~38~~ hours); **ELECTIVE COURSES** = any [9](#) ~~12~~ hours of

approved METR or equivalent coursework; **PLUS** PHYS, 255 256, 265, 266, MATH 136*, 137*, 237, 331.

Will this program be managed or owned by more than one department?

No

Does this program include courses from outside your department?

Yes

Outside Courses

Details

Who approved including these courses?	When were they approved?
<u>Tony Harkins and Melanie Autin</u>	<u>8/21/2026</u>

Learning Outcomes

	List all student learning outcomes of the program.
SLO 1	Students completing the Meteorology program will be able to demonstrate understanding of the theoretical principles surrounding the basic equations and conservation laws that govern atmospheric motion and energy transfer. (Theoretical Meteorology)
SLO 2	Students completing the Meteorology program will be able to demonstrate understanding of the technical principles surrounding the fundamentals of remote sensing and in situ weather instrumentation as well as weather forecasting. (Technical Meteorology)
SLO 3	Sophomore Meteorology students will be able to quickly and accurately analyze a surface map and present a weather forecast discussion based on their analysis (Applied Meteorology)

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Current Assessment

Plan

Current Curriculum

(or Skills) Map

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s)
and Percentage of
Program Offered at
Location(s)

Location	Percentage
Elizabethtown	4%
Fort Knox	4%

Location	Percentage
Glasgow	4%
Owensboro	4%

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

Are there any in-person on-campus requirements?

No

Does this program have experiential learning (practicum/internship/clinical)?

No

Does this program lead to professional licensure (excluding teaching certification)?

No

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php> for link to the Library Resources Form.

Did you complete the Library Resource Form?

Rationale

Rationale for the program proposal?

Adding STAT 301 as an option to the existing GEOG 391 class provides students with increased flexibility for scheduling purposes since there are often three sections of STAT 301 available each semester compared to 1 section of GEOG 391. Both courses provide a sufficient background in Statistical Analysis for a Meteorology major. Many meteorology majors have successfully taken STAT 301 in previous years to fulfill the Statistical Analysis requirement.

Additional Attachments

Additional information or attachments

Reviewer Comments

Leslie North (leslie.north) (08/19/26 11:55 am): Rollback: Make additional edits.

Key: 337

Course Change Request

New Course Proposal

Date Submitted: 06/03/26 9:30 am

Viewing: **SMRT 300 : IIoT Networks and Systems**

Last revision: 06/03/26 9:30 am

Changes proposed by: grg81142

In Workflow

1. **EAS Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 09/21/26 10:11 am
Bryan Reaka
(bryan.reaka):
Approved for EAS Approval
2. 09/28/26 10:49 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

Programs
referencing this
course
: [SMART Manufacturing](#)

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Gregory Arbuckle	greg.arbuckle@wku.edu	270-745-2403

Term for implementation

Spring 2027

Academic Level

Undergraduate

Course prefix (subject area)

SMRT - Smart Manufacturing

Course number

300

Department

Engineering & Applied Sciences, School of

College

Science and Engineering

Course title

Course description

This course provides an introduction to Industrial Internet of Things (IIoT) devices, networks, and standards in the context of converged information technology (IT) and operations technology (OT) industrial automation systems. Course topics include an examination of IT and OT networks, hardware, architecture, protocols, and standards in the context of industrial applications.

Credit hours3

Repeatable
No

Default grade typeStandard LetterAlternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type
Lecture/Lab

CIP Code15.0407 - 15.0407

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
	(	CS 290	C	UG		No
And		EE 180	C	UG	)	No
And	(	MFGE 328	C	UG		No
Or		MFGE 343	C	UG	)	No

Corequisites

Equivalent Courses

Restrictions:

College restriction?No

Field of study
restriction/major? No

Classification
restriction? No

Departmental
Restrictions

Reason for
developing the
proposed course

1. Addressing the "Data Engineering" Gap in Manufacturing While many existing programs teach students how to analyze data (Data Science) or how to move packets (Networking), very few teach the specific engineering challenge of acquiring and structuring industrial data.

- The Technical Problem: Industrial data is notoriously "messy." A factory floor contains legacy machines speaking varying protocols (Modbus, Profinet, Ethernet/IP) and newer sensors outputting JSON or MQTT.
- The Course Solution: SM 325 is developed to teach the "translation layer." It focuses on Data Fusion—the ability to take temperature data from a 30-year-old oven and vibration data from a modern sensor, synchronize them, and store them in a unified format. Without this skill, higher-level analysis is impossible.

2. Strategic Fit within the SMART Manufacturing Program This course is the structural "keystone" of the SMART Manufacturing curriculum, serving as the bridge between physical connectivity and digital intelligence.

3. Necessity of Time-Series Proficiency Standard IT databases (SQL) are often ill-equipped to handle the high velocity of manufacturing data (sometimes thousands of readings per second).

- Development Reason: This course introduces Time-Series Databases (TSDBs), a critical technology in Industry

4.0. Developing this course ensures our graduates are proficient in storage architectures specifically designed for high-frequency sensor data, a skill set highly distinct from traditional business database management.

4. Alignment with Industry 4.0 & CIP 15.0407 The proposed CIP code (15.0407 - Mechatronics, Robotics, and Automation Engineering Technology) emphasizes the application of technology.

- SM 325 fulfills the "Automation" requirement by moving beyond simple mechanical automation to Information Automation. It ensures the program meets the modern definition of a technologist: someone who can manage the full lifecycle of the machine's data, not just the machine's mechanics.

5. Employability & Market Demand Industry advisors indicate that many junior engineers struggle with "Edge Computing"—processing data near the machine rather than sending everything to the cloud.

- Career Readiness: This course explicitly develops "Edge" skills. By learning data fusion and local storage, graduates can design systems that reduce bandwidth costs and latency, making them immediately valuable to employers looking to upgrade legacy facilities.

Is this related to
other courses at
WKU?
No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

None

How many sections of this course per academic year will be offered?

1

How many students per section are expected to enroll in this proposed course?

20

How many students per academic year are expected to enroll?

20

How were these projections calculated? Explain any supporting evidence/data you have for arriving at these projections:

Based upon currently enrollments in MET, CS, and EE.

Is this course part of a program that leads to teacher certificate?

No

Are you seeking Colonnade approval for this course?

No

Student Learning Outcomes

#	Student Learning Outcomes
1	Explain the concept of Industrial Internet of Things (IIoT) and the enabling technologies.

#	Student Learning Outcomes
2	Describe IT and OT development and detail differences in priorities and capabilities.
3	Design, implement, and analyze an integrated industrial network.
4	Configure host-level and network-level technical security controls in IT and OT systems.
5	Apply industry standards and reference architectures to ensure best practices in the selection, deployment, and operation of IIoT devices.

Content outline

#	Topic
1	IIoT Software/Hardware Overview
2	IIoT Programming, Data Structure and Storage
3	Edge Devices
4	Device Handshaking and Communication
5	Industrial Safety

Student
expectations and
requirements

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php>
for link to the Library Resources Form.

Did you complete the Library Resources Form for New Courses?

No

Tentative texts,
course materials,
and special
equipment
N/A

Special equipment,
materials, or library
resources needed
N/A

Additional
information

Supporting
documentation

Reviewer Comments

Key: 10193

Course Change Request

New Course Proposal

Date Submitted: 06/03/26 9:31 am

Viewing: **SMRT 325 : IIoT Data Acquisition, Fusion and Storage**

Last revision: 06/03/26 9:31 am

Changes proposed by: grg81142

In Workflow

1. **EAS Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
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Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Greg Arbuckle	greg.arbuckle@wku.edu	270-745-2403

Term for implementation

Spring 2027

Academic Level

Undergraduate

Course prefix (subject area)

SMRT - Smart Manufacturing

Course number

325

Department

Engineering & Applied Sciences, School of

College

Science and Engineering

Course title

IIoT Data Acquisition, Fusion and Storage

Abbreviated course title IIOT DATA ACQ, FUSION, & Stor

Course description

This course focuses on the technical challenges of extracting, integrating, and persisting data from industrial machinery. Students will learn to interface with heterogeneous sensor networks to acquire raw telemetry data. Key topics include sensor fusion techniques to combine disparate data sources, edge-computing strategies for data pre-processing, and the implementation of time-series databases optimized for high-frequency industrial environments. Students will apply these concepts by building a data pipeline that moves data from the physical shop floor to secure storage architecture.

Credit hours 3

Repeatable
No

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type
Lecture/Lab

CIP Code 15.0407 - 15.0407

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
	(	SMRT 300	C	UG	)	No

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study No

restriction/major?

Classification
restriction? No

Departmental
Restrictions

Reason for
developing the
proposed course

1. Addressing the "Data Engineering" Gap in Manufacturing

While many existing programs teach students how to analyze data (Data Science) or how to move packets (Networking), very few teach the specific engineering challenge of acquiring and structuring industrial data.

- The Technical Problem: Industrial data is notoriously "messy." A factory floor contains legacy machines speaking varying protocols (Modbus, Profinet, Ethernet/IP) and newer sensors outputting JSON or MQTT.
- The Course Solution: SM 325 is developed to teach the "translation layer." It focuses on Data Fusion—the ability to take temperature data from a 30-year-old oven and vibration data from a modern sensor, synchronize them, and store them in a unified format. Without this skill, higher-level analysis is impossible.

2. Strategic Fit within the SMART Manufacturing Program

This course is the structural "keystone" of the SMART Manufacturing curriculum, serving as the bridge between physical connectivity and digital intelligence.

3. Necessity of Time-Series Proficiency

Standard IT databases (SQL) are often ill-equipped to handle the high velocity of manufacturing data (sometimes thousands of readings per second).

- Development Reason: This course introduces Time-Series Databases (TSDBs), a critical technology in Industry 4.0. Developing this course ensures our graduates are proficient in storage architectures specifically designed for high-frequency sensor data, a skill set highly distinct from traditional business database management.

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Industry advisors indicate that many junior engineers struggle with "Edge Computing"—processing data near the machine rather than sending everything to the cloud.

- Career Readiness: This course explicitly develops "Edge" skills. By learning data fusion and local storage, graduates can design systems that reduce bandwidth costs and latency, making them immediately valuable to employers looking to upgrade legacy facilities.

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

None

How many sections
of this course per
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How many students
per section are
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this proposed
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How many students
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enroll?

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How were these
projections
calculated? Explain
any supporting
evidence/data you
have for arriving at
these projections:

Based upon current enrollment of the programs.

Is this course part of
a program that leads
to teacher
certificate?

No

Are you seeking
Colonnade approval
for this course?

No

Student Learning
Outcomes

#	Student Learning Outcomes
1	1. Design Multi-Protocol Data Acquisition Pipelines Students will be able to configure and deploy edge gateway software to ingest raw telemetry data from heterogeneous industrial sources (e.g., Modbus TCP, OPC UA, MQTT) into a unified digital environment.
2	2. Implement Sensor Fusion Techniques Students will be able to write scripts that aggregate, synchronize, and normalize asynchronous data streams from multiple sensors to construct a coherent, single-source-of-truth record of machine performance.
3	3. Optimize Time-Series Storage Architectures Students will be able to design and query time-series database (TSDB) schemas that efficiently handle high-frequency, high-volume industrial sensor data, differentiating them from relational database models.
4	4. Execute Edge-Based Data Processing Students will be able to apply data pre-processing logic at the network edge—including filtering noise, down-sampling frequencies, and buffering for outages—to ensure data quality and reduce bandwidth prior to cloud transmission.

Content outline

#	Topic
1	Fundamentals of Industrial Data • The Data Lifecycle: Generation, Acquisition, Transportation, Storage, Analysis. • Data Types in Manufacturing: Discrete (Counters), Analog (Temperature, Pressure), Digital (On/Off), and Waveform (Vibration). • Challenges of IIoT Data: Volume (High frequency), Velocity (Streaming speed), Variety (Structured vs. Unstructured), and Veracity (Noise/Quality).
2	Data Acquisition (DAQ) Strategies • Interfacing with Hardware: Analog-to-Digital Converters (ADC) and signal conditioning. • Industrial Protocols: - o Legacy: Modbus TCP/RTU, Profinet, Ethernet/IP. - o Modern IIoT: MQTT (Publish/Subscribe model), OPC UA (Open Platform Communications Unified Architecture), REST APIs. • The "Edge" Gateway: Role of the gateway in translating protocols; configuring gateway software (e.g., Node-RED, Kepware, or Ignition Edge).
3	Data Fusion & Pre-Processing • Time Synchronization: Handling latency and aligning timestamps from asynchronous sensors. • Sensor Fusion Levels: - o Data-Level Fusion: Raw data combination. - o Feature-Level Fusion: Extracting features before combining. • Data Cleaning: Filtering signal noise, handling missing values, and outlier detection.

#	Topic
	• Normalization: Converting raw engineering units (e.g., 4-20mA signals) into human-readable formats (e.g., Degrees Celsius).
4	Storage Architectures • Relational vs. Non-Relational: Why SQL struggles with IIoT data; introduction to NoSQL. • Time-Series Databases (TSDB): - o Architecture of TSDBs (e.g., InfluxDB, Prometheus, TimescaleDB). - o Writing, querying, and down-sampling time-stamped data. - o Data Retention Policies (managing storage costs). • Historians: Traditional industrial historians vs. modern open-source databases.
5	Edge Computing & Reliability • Edge Intelligence: Performing calculations at the source to reduce bandwidth (e.g., calculating a moving average on the device). • Buffering & Queuing: "Store and Forward" techniques to handle network outages without data loss. • Data Security: Basic encryption for data at rest and data in transit.
6	Final Project Implementation • System Integration: Building a complete end-to-end pipeline. - o Input: Real (or simulated) sensor data. - o Process: Edge Gateway processing and Fusion. - o Output: Persistent storage in a Time-Series Database and visualization on a dashboard (e.g., Grafana).

Student
expectations and
requirements

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php>
for link to the Library Resources Form.

Did you complete the Library Resources Form for New Courses?

No

Tentative texts,
course materials,
and special
equipment
N/A

Special equipment,
materials, or library
resources needed
N/A

Additional
information

Supporting
documentation

Reviewer Comments

Key: 10155

Course Change Request

New Course Proposal

Date Submitted: 06/03/26 9:32 am

Viewing: **SMRT 350 : IIoT Data Modeling and Analysis**

Last revision: 06/03/26 9:32 am

Changes proposed by: grg81142

In Workflow

- 1. **EAS Approval**
- 2. **SC Dean**
- 3. **SC Curriculum Committee**
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Programs
referencing this
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Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Gregory Arbuckle	greg.arbuckle@wku.edu	270-745-2403

Term for implementation

Spring 2027

Academic Level

Undergraduate

Course prefix (subject area)

SMRT - Smart Manufacturing

Course number

350

Department

Engineering & Applied Sciences, School of

College

Science and Engineering

Course title

IIoT Data Modeling and Analysis

Abbreviated course title IIOT DATA MODELING & ANALYSIS

Course description

This course addresses application of industrial internet of things (IIoT) for modeling and simulation of smart manufacturing assets, processes, and operations. Emphasis is on synchronizing modeling/simulation with real-time data to develop innovative services, create efficiencies, and enable productivity improvement in smart factories.

Credit hours 3

Repeatable
No

Default grade type Standard Letter Alternate grade type(s)

Is this course intended to span more than one term?

No

Schedule type
Lecture/Lab

CIP Code 15.0407 - 15.0407

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
	(	SMRT 325	C	UG	)	No

Corequisites

Equivalent Courses

Restrictions:

College restriction? No

Field of study restriction/major? No

Classification restriction? No

Departmental Restrictions

Reason for
developing the
proposed course

1. Addressing the "Data Engineering" Gap in Manufacturing

While many existing programs teach students how to analyze data (Data Science) or how to move packets (Networking), very few teach the specific engineering challenge of acquiring and structuring industrial data.

- The Technical Problem: Industrial data is notoriously "messy." A factory floor contains legacy machines speaking varying protocols (Modbus, Profinet, Ethernet/IP) and newer sensors outputting JSON or MQTT.
- The Course Solution: SM 325 is developed to teach the "translation layer." It focuses on Data Fusion—the ability to take temperature data from a 30-year-old oven and vibration data from a modern sensor, synchronize them, and store them in a unified format. Without this skill, higher-level analysis is impossible.

2. Strategic Fit within the SMART Manufacturing Program

This course is the structural "keystone" of the SMART Manufacturing curriculum, serving as the bridge between physical connectivity and digital intelligence.

3. Necessity of Time-Series Proficiency

Standard IT databases (SQL) are often ill-equipped to handle the high velocity of manufacturing data (sometimes thousands of readings per second).

- Development Reason: This course introduces Time-Series Databases (TSDBs), a critical technology in Industry 4.0. Developing this course ensures our graduates are proficient in storage architectures specifically designed for high-frequency sensor data, a skill set highly distinct from traditional business database management.

4. Alignment with Industry 4.0 & CIP 15.0407

The proposed CIP code (15.0407 - Mechatronics, Robotics, and Automation Engineering Technology) emphasizes the application of technology.

- SM 325 fulfills the "Automation" requirement by moving beyond simple mechanical automation to Information Automation. It ensures the program meets the modern definition of a technologist: someone who can manage the full lifecycle of the machine's data, not just the machine's mechanics.

5. Employability & Market Demand

Industry advisors indicate that many junior engineers struggle with "Edge Computing"—processing data near the machine rather than sending everything to the cloud.

- Career Readiness: This course explicitly develops "Edge" skills. By learning data fusion and local storage, graduates can design systems that reduce bandwidth costs and latency, making them immediately valuable to employers looking to upgrade legacy facilities.

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

None

How many sections of this course per academic year will be offered?

1

How many students per section are expected to enroll in this proposed course?

20

How many students per academic year are expected to enroll?

20

How were these projections calculated? Explain any supporting evidence/data you have for arriving at these projections:

Based upon current enrollments in CS, EE, and MET

Is this course part of a program that leads to teacher certificate?

No

Are you seeking Colonnade approval for this course?

No

Student Learning Outcomes

#	Student Learning Outcomes
1	1. Describe the convergence of the physical and digital worlds, technology, and standards of IIoT-aided modeling and simulation.

#	Student Learning Outcomes
2	Implement process data modeling and application to various types of plant data (drives, pumps, production lines) using real-time, historical, and event-based data
3	Develop digital/virtual-cloud representation models to be mirrored onto physical manufacturing systems.
4	Create digital twin (DT) models using data from IIoT devices for monitoring and automating control of smart connected assets.
5	Construct DT-oriented simulation model for IIoT-aided manufacturing system for applications in productivity, reliability, efficiency, and predictive maintenance operations.
6	Develop application of manufacturing model proxies in diagnostic and troubleshooting operations.

Content outline

#	Topic
1	IIoT-aided modeling and simulation
2	Digital/virtual-cloud representation models
3	Digital Twin (DT)

Student
expectations and
requirements

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php>
for link to the Library Resources Form.

Did you complete the Library Resources Form for New Courses?

No

Tentative texts,
course materials,
and special
equipment
N/A

Special equipment,
materials, or library
resources needed
N/A

Additional
information

Supporting
documentation

Reviewer Comments

Key: 10194

Course Change Request

New Course Proposal

Date Submitted: 12/08/25 2:47 pm

Viewing: **SMRT 490 : Senior Research for Smart Manufacturing**

Last revision: 12/08/25 2:47 pm

Changes proposed by: bry60656

In Workflow

1. **EAS Approval**
2. **SC Dean**
3. **SC Curriculum Committee**
4. Undergraduate Curriculum Committee
5. University Senate
6. Provost
7. Course Inventory

Approval Path

1. 09/21/26 10:11 am
Bryan Reaka
(bryan.reaka):
Approved for EAS Approval
2. 09/28/26 10:49 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

Programs
referencing this
course
: [SMART Manufacturing](#)

Proposed Action

Active

Contact(s)

Name	E-mail	Phone
Bryan Reaka	bryan.reaka@wku.edu	2707457032

Term for implementation

Fall 2026

Academic Level

Undergraduate

Course prefix (subject area)

SMRT - Smart Manufacturing

Course number

490

Department

Engineering & Applied Sciences, School of

College

Science and Engineering

Course title

Senior Research for Smart Manufacturing

Abbreviated course titleSR RESEARCH SMART MANUFACTURIN

Course description

Students work on capstone research projects utilizing skills and knowledge from prior courses in the Smart Manufacturing program. This is a lecture lab course that will incorporate aspects of smart manufacturing integration into a manufacturing simulation, or actual equipment closely resembling those being used in advanced manufacturing facilities around the globe.

Credit hours3

Repeatable

Yes
Number of repeats2
For maximum credits3

Default grade typePass/FailAlternate grade type(s)
Pass/Fail

Is this course intended to span more than one term?

No

Schedule type
Lecture/Lab

CIP Code15.0407 - 15.0407

Does this course have prerequisites

Yes

Prerequisites

And/Or	(	Course/Test Code	Min Grade/Score	Academic Level	)	Concurrency?
		SMRT 350	C	UG		No

Corequisites

Equivalent Courses

Restrictions:

College restriction?Yes

Select:

Include

College:

College
Science and Engineering

Field of study
restriction/major?

Yes

Select:

Include

Major:

Field of stud/major restriction
117 - Computer Science
5007 - Engineering Technology Management
5015 - Mechatronics Engineering Technology
537 - Electrical Engineering

Classification
restriction?

Yes

Select:

Include

Classification:

Classification restriction
Junior
Senior

Departmental
Restrictions

Reason for
developing the
proposed course

This course will be a capstone course for the new SMART Manufacturing Program

Is this related to
other courses at
WKU?

No

What departments/programs have been consulted concerning potential impact (e.g. to possible duplication or conflict, changed corequisite or prerequisite for equivalent courses, etc.)? Please provide names and dates for individuals consulted.

The School of Engineering and Applied Sciences program coordinators for Electrical Engineering, Computer Science and Mechatronics Engineering Technology were consulted on

How many sections
of this course per
academic year will
be offered?

1

How many students
per section are
expected to enroll in
this proposed
course?

12-15

How many students
per academic year
are expected to
enroll?

12-15

How were these
projections
calculated? Explain
any supporting
evidence/data you
have for arriving at
these projections:

Based upon this being one of three possible courses that will satisfy this criteria within the SMART Manufacturing Program. this will provide

Is this course part of No
a program that leads
to teacher
certificate?

Are you seeking No
Colonnade approval
for this course?

Student Learning
Outcomes

#	Student Learning Outcomes
1	Apply knowledge gained in previous courses to gather information from a specific piece of equipment to solve a technical problem.
2	Integration of sensors into an existing piece of equipment.
3	Collect and analyze real time data for uses in Industrial Setting.

Content outline

#	Topic
1	Attaching Sensors
2	Data collection
3	Interpreting data
4	Predict equipment failure

Student
expectations and
requirements

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php>
for link to the Library Resources Form.

Did you complete the Library Resources Form for New Courses?

Tentative texts,
course materials,
and special
equipment

No text will be used in this course as it will be a compilation of knowledge the students will have learned in previous other courses in the program.

Special equipment,
materials, or library
resources needed

- equipment will revolve around that which is currently located in Rooms ESt 107, EST 109 and EST 111
- Online resources from the Library adequate
- Some few special sensors may be needed based upon individual projects students will be working on through the course.

Additional
information

Supporting
documentation

Reviewer Comments

Key: 10156

Program Change Request

Date Submitted: 08/21/26 3:56 pm

Viewing: **578 : Meteorology, Bachelor of Science**

Last approved: 06/17/26 2:55 pm

Last edit: 08/21/26 3:56 pm

Changes proposed by: grg07567

Catalog Pages
Using this Program
[Meteorology, Bachelor of Science \(578\)](#)

Proposed Action

In Workflow

- 1. GEO Approval
- 2. SC Dean
- 3. SC Curriculum Committee
- 4. Undergraduate Curriculum Committee
- 5. University Senate
- 6. Provost
- 7. Program Inventory

Approval Path

- 1. 08/19/26 11:55 am
Leslie North
(leslie.north):
Rollback to Initiator
- 2. 09/06/26 1:01 pm
Leslie North
(leslie.north):
Approved for GEO Approval
- 3. 09/28/26 10:49 am
Stuart Burris
(stuart.burris):
Approved for SC Dean

History

- 1. May 26, 2021 by
Rheanna Plemons
(rheanna.plemons)
- 2. Sep 27, 2021 by
Jennifer Hammonds
(jennifer.hammonds)
- 3. Feb 27, 2023 by
Gregory Goodrich
(gregory.goodrich)
- 4. Jul 6, 2023 by Ryan
Wilson (ryan.wilson)

5. Apr 3, 2025 by
Gregory Goodrich
(gregory.goodrich)

6. Oct 16, 2025 by
zch82449

7. Jun 17, 2026 by
Ryan Wilson
(ryan.wilson)

Active

Contact Person

Name	Email	Phone
Greg Goodrich	gregory.goodrich@wku.edu	270-320-3897

Term of Implementation 2027-2028

Program Reference Number 578

Review Type Full Review

Academic Level Undergraduate

Program Type Major

Degree Types Bachelor of Science

Department Geography & Geology

College Science and Engineering

Program Name (eg. Biology) Meteorology, Bachelor of Science

Will this program have concentrations?
No

CIP Code 40.0404 - Meteorology.

Will this program lead to teacher certification? No

Does the proposed program contain 25% or more new content not previously taught in another course at WKU? If yes, contact the Office of the Provost for additional SACSCOC proposal requirements

No

Catalog Content

Program Overview (Catalog field: Overview tab)

The B.S. in Meteorology degree at WKU is the first and largest meteorology program in Kentucky or Tennessee that meets all the Federal Civil Service requirements (GS-1340) for employment by the National Weather Service and enables TV broadcast meteorologists to immediately pursue the "Certified Broadcast Meteorologist" program of the American Meteorological Society upon graduation. In addition to preparing students for immediate employment as meteorologists, the combination of advanced theoretical and applied coursework as well as experience with meteorological instrumentation and computer programming will provide a foundation for students who wish to pursue graduate school in the atmospheric sciences. Students will become more directly involved in faculty-sponsored research, increased co-authorship of peer-reviewed research articles, and increased presentation of research results at professional meetings and conferences. Students will also have the opportunity to work for White Squirrel Weather (WSWX), which acts as the WKU weather service, where students make weather observations and weather forecasts to provide decision support to a variety of WKU entities, including WKU Athletics, Environmental Health and Safety, and WKU Admissions.

Curriculum Requirements (Catalog field: Program Requirements)

Program Requirements (50 hours)

Approved Shared Content from /shared/undergraduate-major-requirements/
Last Approved: May 21, 2026 2:57pm

A baccalaureate degree requires a minimum of 120 unduplicated semester hours. More information can be found at www.wku.edu/registrar/degree_certification.php.
Students who began WKU in the Fall 2014 and thereafter should review the Colonnade requirements located at: <https://www.wku.edu/colonnade/colonnaderequirements.php>.

The major in Meteorology leads to a Bachelor of Science in Meteorology and requires a minimum of 50 semester hours of meteorology, geography, GIS, and computer science. A minor program is not required. Other required courses in physics and mathematics total an additional 25 semester hours. Students majoring in meteorology will learn the key concepts and skills necessary to qualify as a meteorologist for the National Weather Service, and to meet the standards of the American Meteorological Society.

Required Courses

METR 121	Meteorology	3
METR 122	Aviation Meteorology	3
CS 170	Problem Solving and Programming	3
GEOG 300	Writing in the Geosciences	3
GISC 316	Geographic Information Systems I	4
METR 324	Weather Analysis and Forecasting	3
GEOG 391	Geoscience Statistical Analysis	4
or STAT 301	Introductory Probability and Applied Statistics	
METR 431	Dynamic Meteorology I	3
METR 432	Synoptic Meteorology	3

<u>METR 433</u>	Dynamic Meteorology II	3
<u>METR 437</u>	Mesoscale Meteorology	3
<u>METR 438</u>	Physical Meteorology	3
Meteorology Technique Course		
<u>METR 325</u>	Meteorological Instrumentation and Measurement	3
or <u>METR 335</u>	Satellite/Radar Meteorology	
Total Hours		41

In addition to the required courses, select 9 hours from any 200-level or above METR course

Suggested courses include:		9
<u>METR 322</u>	Global Climate Systems	
<u>METR 325</u>	Meteorological Instrumentation and Measurement	
<u>METR 326</u>	Applied Meteorology / Climatology	
<u>METR 335</u>	Satellite/Radar Meteorology	
<u>METR 422</u>	Physical Climatology	
<u>METR 425</u>	Field Methods in Severe Weather Analysis and Forecasting	
<u>METR 430</u>	Meteorological Computing	
<u>METR 439</u>	Atmospheric Modeling	
<u>METR 460</u>	Climate Teleconnections	
<u>METR 475</u>	Selected Topics in Meteorology	
Total Hours		9

Additional Courses Required Outside of the Major

<u>PHYS 255</u> & <u>PHYS 256</u>	University Physics I and University Physics I Lab	5
<u>PHYS 265</u> & <u>PHYS 266</u>	University Physics II and University Physics II Laboratory	5
<u>MATH 136</u>	Calculus I	4
<u>MATH 137</u>	Calculus II	4
<u>MATH 237</u>	Multivariable Calculus	4
<u>MATH 331</u>	Differential Equations	3
Total Hours		25

4-Year Plan

Finish in Four Plan

First Year

Fall	Hours	Spring	Hours
METR 121	3	MATH 137	4
ENG 100	3	METR 122	3
MATH 136	4	HIST 101 or HIST 102	3
Colonnade - Social & Behavioral	3	COMM 145	3
GEOG 175	2	General Elective	3
	15		16

Second Year

Fall	Hours	Spring	Hours
MATH 237	4	MATH 331	3
METR Elective	3	METR 324	3
GISC 316	4	World Language or General Elective	3
Colonnade - Arts & Humanities	3	ENG 200	3
		CS 170	3
	14		15

Third Year

Fall	Hours	Spring	Hours
METR 431	3	METR 433	3
GEOG 300	3	Colonnade - Connections	3
METR 335 (or METR Elective)	3	METR 438	3
PHYS 255	5	PHYS 265	5
& PHYS 256		& PHYS 266	
General Elective	3		
	17		14

Fourth Year

Fall	Hours	Spring	Hours
METR 432	3	METR 437	3
Colonnade - Connections	3	METR 325 (or METR Elective)	3
METR Elective or Independent Research	3	GEOG 391 or STAT 301	4
General Elective	3	Colonnade - Connections	3
General Elective	3	General Elective	1
	15		14

Total Hours 120

120 Hours total are required in the program, with 42 hours at the 300/400 level.

Summer courses, including Study Abroad, Field Camps, and other independent research opportunities, can reduce the number of hours required in the regular semesters.

Any of the courses can be moved from semester to semester to take advantage of courses when offered.

The WKU Colonnade Program requires a minimum of 39 hours, with several required courses in the Geography program that can be double-counted. METR/GEOG courses marked * count for Colonnade Credit.

Colonnade Connections courses are restricted to Juniors/Seniors, unless 21 credit hours of Colonnade Explorations and Foundations courses have already been completed. Three disciplines are required for Connections credit (METR, GEOG, GEOL, and GISC count as separate disciplines).

REQUIRED IN THE MAJOR ([50](#) ~~48~~ hours): **CORE COURSES** = METR 121*, 122, CS 170, GEOG 300*, 391, GISC 316, METR 324, 431, 432, 433, 437, [438](#), and [325 OR 335](#) ([41](#) ~~438~~ ~~38~~ hours); **ELECTIVE COURSES** = any [9](#) ~~12~~ hours of

approved METR or equivalent coursework; **PLUS** PHYS, 255 256, 265, 266, MATH 136*, 137*, 237, 331.

Will this program be managed or owned by more than one department?

No

Does this program include courses from outside your department?

Yes

Outside Courses

Details

Who approved including these courses?	When were they approved?
<u>Tony Harkins and Melanie Autin</u>	<u>8/21/2026</u>

Learning Outcomes

	List all student learning outcomes of the program.
SLO 1	Students completing the Meteorology program will be able to demonstrate understanding of the theoretical principles surrounding the basic equations and conservation laws that govern atmospheric motion and energy transfer. (Theoretical Meteorology)
SLO 2	Students completing the Meteorology program will be able to demonstrate understanding of the technical principles surrounding the fundamentals of remote sensing and in situ weather instrumentation as well as weather forecasting. (Technical Meteorology)
SLO 3	Sophomore Meteorology students will be able to quickly and accurately analyze a surface map and present a weather forecast discussion based on their analysis (Applied Meteorology)

Assessment Template: https://www.wku.edu/academicaffairs/ee/assurance_learning_resources.php

Current Assessment

Plan

Current Curriculum

(or Skills) Map

Delivery Mode

Is 25% or more of this program offered at a location other than main campus?

No

Enter Location(s)
and Percentage of
Program Offered at
Location(s)

Location	Percentage
Elizabethtown	4%
Fort Knox	4%

Location	Percentage
Glasgow	4%
Owensboro	4%

Is 50% or more of this program offered by distance education (online asynchronous, online synchronous, connected classrooms, etc.)?

No

Do you plan to offer 100% of this program online?

No

If no, enter the percentage of the program that will be taught online.

0

Do you plan to offer 100% of this program face-to-face?

Yes

Do you plan to offer at least 25% of this program as a direct assessment competency-based educational program?

No

Are there any in-person on-campus requirements?

No

Does this program have experiential learning (practicum/internship/clinical)?

No

Does this program lead to professional licensure (excluding teaching certification)?

No

Library Resources

Click here <https://www.wku.edu/library/services/access/faculty/resourcesform.php> for link to the Library Resources Form.

Did you complete the Library Resource Form?

Rationale

Rationale for the program proposal?

Adding STAT 301 as an option to the existing GEOG 391 class provides students with increased flexibility for scheduling purposes since there are often three sections of STAT 301 available each semester compared to 1 section of GEOG 391. Both courses provide a sufficient background in Statistical Analysis for a Meteorology major. Many meteorology majors have successfully taken STAT 301 in previous years to fulfill the Statistical Analysis requirement.

Additional Attachments

Additional information or attachments

Reviewer Comments

Leslie North (leslie.north) (08/19/26 11:55 am): Rollback: Make additional edits.

Key: 337