

Program Change Request

New Program Proposal

Date Submitted: 07/16/24 10:11 am

Viewing: : **Clean Energy Studies**

Last edit: 07/16/24 10:11 am

Changes proposed by: jbazaz

Are you completing this form on someone else's behalf?

Yes

Requestor:

In Workflow

- 1. **PHYS UG Committee**
- 2. **PHYS Chair**
- 3. **SC Curriculum Committee**
- 4. SC Assistant Dean
- 5. Assoc Provost-Undergraduate
- 6. Registrar:Create Code
- 7. Registrar-Programs: Duration
- 8. Registrar-Programs

Approval Path

- 1. 09/08/24 1:13 pm
Philip Rubin
(prubin): Approved for PHYS UG Committee
- 2. 09/08/24 1:23 pm
Ernest Barreto
(ebarreto): Approved for PHYS Chair

Name	Extension	Email
Walter L. McLeod	5302	wmcleod4@gmu.edu

Effective Catalog: 2025-2026

Program Level: Undergraduate

Program Type: Minor

Title: Clean Energy Studies

Banner Title: Clean Energy Studies Minor

Is this a retitling of an existing program? No

Registrar's Office Use Only – Program Start Term

Registrar/OAPI Use Only – SACSCOC Status

College/School: College of Science

Department / Academic Unit: Physics & Astronomy

Jointly Owned Program? No

Justification

What: Creating a new minor.

Why: There are strong recent trends that point toward demand for Clean Energy studies:
"2023 United States Energy & Employment Report

This report was prepared by the U.S. Department of Energy's (DOE) Office of Energy Jobs, with significant contributions and recommendations from the interagency Energy Jobs Council. The Energy Jobs Council is comprised from the Department of Commerce, U.S. Census Bureau, Bureau of Labor Statistics, Energy Information Administration, Department of Energy State Energy Advisory Board, and Department of Transportation.

The United States has a goal to reach net-zero greenhouse gas emissions by 2050. "Net-zero emissions" refers to achieving an overall balance between greenhouse gas emissions produced, avoided, and removed from the atmosphere. In this report, "clean energy jobs" are reported at the national and state levels with slightly different definitions due to data availability.

Nationally, clean energy jobs include jobs in the technologies that align with this "net-zero" future, including those related to renewable energy; grid technologies and storage; traditional electricity transmission and distribution for electricity; nuclear energy; a subset of energy efficiency that does not involve fossil fuel burning equipment; biofuels; and plug-in hybrid, battery electric, and hydrogen fuel cell vehicles and components.

In 2022, there were 3.1 million clean energy jobs meeting the net-zero aligned definition. This represents an increase of more than 114,000 since 2021, or growth of 3.9%. These jobs made up more than 40% of total energy jobs in 2022.

KEY STATISTICS

- Clean energy jobs increased in every state and grew 3.9% nationally from 2021 to 2022.

- The number of jobs in battery electric vehicles increased by 28,366 (+27%) from 2021 to 2022, which was the fastest growth of any energy technology. The growth in battery electric vehicles was almost 17 times faster than the increase in gasoline and diesel vehicle employment.
- Clean vehicles accounted for 59% of all net new jobs in motor vehicles.
- Other technologies with double-digit growth include offshore wind (20%), other grid modernization (12%), coal fuel (22%), natural gas fuel (24%), petroleum (13%), hydrogen fuel cell vehicles (25%), natural gas vehicles (14%), and plug-in hybrid vehicles (10%).
- Clean energy electricity technologies, such as solar and wind, accounted for nearly 87% of net new electric power generation jobs, adding 22,279 jobs (+3.6%).
- Employers across all technologies report they expect growth from 2022 to 2023, ranging from 1.6% in fuels to 6.4% in energy efficiency.
- The number of women working in energy increased by 149,732 (+7.8%), meaning that over half of the net jobs added in 2022 were held by women.
- Veterans made up 9% of the U.S. energy workforce, higher than their representation in the overall U.S. economy (5%).

In November 2021, the Infrastructure Investment and Jobs Act (the Bipartisan Infrastructure Law) (Pub. L. 117-58) was signed into law. The \$1.2 trillion infrastructure law allocates more than \$75 billion to clean energy, including \$7.5 billion for EV charging infrastructure and \$62 billion for the DOE to revitalize domestic supply chains and strengthen America's manufacturing leadership; expand access to energy efficiency and clean energy for families, communities, and businesses; deliver reliable, clean, and affordable power to more Americans; and build the technologies of tomorrow through clean energy demonstrations.

In August 2022, the Inflation Reduction Act (IRA) (Pub. L. 117-169) was enacted, investing approximately \$370 billion in clean energy and climate over 10 years. In addition to a broad portfolio of tax credits that will incentivize the creation and deployment of thousands of new clean energy projects across the country, IRA funding includes \$2.0 billion for the domestic production of advanced vehicles, \$5.8 billion to reduce industrial emissions, \$9.0 billion for states to provide home retrofit and energy efficiency consumer rebates, \$27 billion to the Greenhouse Gas Reduction Fund, and \$40 billion in new loan authority to guarantee loans for innovative clean energy projects.

Also in 2022, the Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act (Pub. L. 117-167) was signed into law, authorizing historic levels of funding to support the production of semiconductors and other strategic technologies, including \$67 billion to the DOE to enable cutting-edge research and development in clean energy, improve infrastructure at the National Labs, and support investments in innovation and technology hubs across the country.

Together, these “Invest in America” laws provide the funding needed to modernize America’s electrical grid, revitalize our manufacturing capabilities, strengthen pathways for STEM careers, and expand access to clean energy, all while addressing legacy pollution, creating quality jobs, and building healthier communities.

Many projects funded under these laws are still in the design and planning phases, and the full job creation of these investments will likely show up in future surveys."

Please see attached chart.

Catalog Published Information

Total Credits Required: Total credits: 18

Registrar's Office Use Only - Program Code:

Registrar/IRR Use Only – Program CIP Code

Admission Requirements:

Program-Specific Policies:

Policies

Eight credits of coursework must be unique to the minor. For policies governing all minors, see [AP.5.3.4 Minors](#).

Degree Requirements:
Banner Code: CLES

Minor Requirements

Total credits: 18

Students should refer to the [Admissions & Policies](#) tab for specific policies related to this program.

Required Courses

Mandatory Required Courses

RENE 131	Introduction to Renewable Energy	3
BUS 295	Business Models For Sustainability	3

ECE 311	Energy Infrastructure, Market, and Management	3
Additional Required Courses		3
Select one from the following:		
COS 310	Introduction to Science Policy (Mason Core)	
EVPP 361	Introduction to Environmental Policy	
BUS 200	Global Environment of Business (Mason Core)	
CEIE 100	Environmental Issues and Solutions Around the World (Mason Core)	
Total Credits		12
Elective Courses		
Select two courses from the following tracks: ^{1,2}		6
Track One: Science & Technology		
COS 300	Professional Preparation for STEM Disciplines	3
EVPP 429	Environmental Science Communication	3
EVPP 432	Energy Policy	3
PHYS 331	Physics of Renewable Energy	3
ECE 411	Electricity Sector Engineering, Economics, and Regulation	3
ECE 417	Smart Grid and Cyber Security	3
Track Two: Business & Economics		
EVPP 322	Business and Sustainability	3
EVPP 338	Economics of Environmental Policy	3
BULE 303	Legal Environment of Business	3
BUS 210	Business Analytics I (Mason Core)	3
ECON 105	Environmental Economics for the Citizen (Mason Core)	3
MGMT 303	Principles of Management	3

¹
Students may select elective courses from a single track or a combination of the two tracks. "Additional Required Courses" listed under the "Required Courses" section may also be selected as electives, if not previously taken.

²
Some courses require specific academic standing or recommend/require coursework prior to or concurrent with enrollment. Please review a course's catalog entry before registering.

**Retroactive
Requirements
Updates:**

Program Outcomes

OAPI Use Only – Determination of SACSCOC Impact

Comments or Notes

Does this program cover material which crosses into another department?

No

**Additional
Attachments**

[Clean Energy Studies \(Program Approval Form COSCC\) 240319.pdf](#)

**Reviewer
Comments**

**Additional
Comments**

This minor will be managed by Walter McLeod and Joe Weingartner.

Is this course required of all students in this degree program?

%wi_required.eshtml%