

**Innovative technologies in the design of biotechnological processes**

Instructors:

Gennadii Golub

Anna Holubenko



**Course Handbook**

TREATY - Nurturing deep tech talents for clean and sustainable energy transition

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## Course Information

Title: Innovative technologies in the design of biotechnological processes

Instructor(s): Gennadii Golub, Anna Holubenko

ECTS: 3

|  |  |
| --- | --- |
| Course structure: | 90 hours |
| Lecture classes | 15 hours |
| Laboratory classes | 15 hours |
| Personal Activities | 60 hours |

Mode of delivery: *[ hybrid]*

### Course Summary

*The purpose of the educational discipline is to form the future specialist's ability to apply acquired knowledge, skills, communication skills, and abilities when solving tasks and problematic issues regarding design of innovative biotechnological processes and equipment in agriculture and to introduce these technologies into professional activity.*

*The main task is to acquire knowledge and practical skills about up-to-date biotechnologies and equipment for alternative energy production in agrarian sector of Ukraine.*

### Learning Outcomes

Upon completion of the course, students will be able to know about:

1. *Innovative technologies and equipment for the production of biodiesel, bioethanol and pyrolysis oil from vegetable raw materials. Modern types of equipment for conversion these types of liquid fuels into energy.*
2. *Innovative technologies and equipment for the production of solid fuels from the plant biomass. Modern types of equipment for conversion these types of solid fuels into energy.*
3. *Innovative technologies and equipment for the production of biogas, syn-gas and pyrolysis gas from vegetable raw materials. Modern types of equipment for conversion these types of gaseous fuels into energy.*
4. *Innovative technologies and equipment for solar energy conversion into electricity.*
5. *Innovative technologies and equipment for wind energy conversion into electricity.*

### Assessment

In order for each participant to complete successfully the course and be awarded the corresponding ECTS credits, they must pass the course assessment. The outcome of the assessment can be either Pass or Fail.

**Assessment methods**

* Exam

|  |  |
| --- | --- |
| **Learning outcomes** | **Assessment examples** |
| * *Innovative technologies and equipment for the production of biodiesel, bioethanol and pyrolysis oil from vegetable raw materials. Modern types of equipment for conversion these types of liquid fuels into energy.* | Oral presentation, quiz, laboratory research |
| * *Innovative technologies and equipment for the production of solid fuels from the plant biomass. Modern types of equipment for conversion these types of solid fuels into energy.* | Oral presentation, quiz, laboratory research |
| * *Innovative technologies and equipment for the production of biogas, syn-gas and pyrolysis gas from vegetable raw materials. Modern types of equipment for conversion these types of gaseous fuels into energy.* | Oral presentation, quiz, laboratory research |
| * *Innovative technologies and equipment for solar energy conversion into electricity.* | Oral presentation, quiz, laboratory research |
| * *Innovative technologies and equipment for wind energy conversion into electricity.* | Oral presentation, quiz, laboratory research |

### Bibliography

*[Please provide of a list of bibliography and useful resources]*

1. Відновлювана енергетика в аграрному виробництві / Скидан О.В., Голуб Г.А., Кухарець С.М., Ярош Я.Д., Чуба В.В., Цивенкова Н.М., Марус О.А., Павленко М.Ю.; за ред. О.В. Скидана і Г.А. Голуба. Житомир-Київ: Поліський університет-НУБіП України, 2022. 422 с.
2. Відновлювана енергетика в аграрному виробництві / Скидан О.В., Голуб Г.А., Кухарець С.М., Ярош Я.Д., Чуба В.В., Медведський О.В., Цивенкова Н.М., Соколовський О.Ф., Кухарець В.В.; за ред. О.В. Скидна і Г.А. Голуба. Київ-Житомир: НУБіП України-ЖНАЕУ, 2023. 449 с.
3. Машини та обладнання для біоенергетики: навч. посіб. / Голуб Г. А., Цивенкова Н. М., Марус О. А., Павленко М. Ю., Яременко О. А.; за ред. Г. А. Голуба. – К.: НУБіП України, 2022. 203 с.
4. Біоенергетичні системи в аграрному виробництві: навчальний посібник / за ред. Г.А. Голуба. К.: НУБіП України, 2017. 229 с.
5. Виробництво і використання біопалив в агроекосистемах. Механіко-технологічні основи: монографія / Голуб Г. А., Кухарець С.М., Чуба В. В., Марус О.А.; за ред. Г. А. Голуба. К.: НУБіП України, 2018. 254 с.
6. Основи виробництва та використання біоетанолу. Методичні вказівки до виконання лабораторних робіт з дисципліни «Машини та обладнання для біотехнологій» ОС «Бакалавр» зі спеціальності «Агроінженерія» / Голуб Г.А., Чуба В.В., Павленко М.Ю. К.: НУБіП України, 2019. 30 с.
7. G. Golub, O. Marus V. Chuba, M. Pavlenko. Research of the hydro-mechanical mixer parameters for diesel biofuel production with using Box-Benghken experiment plan. – Agricultural Engineering International: CIGR Journal, 2019, vol. 21, no. 4, 121–131.
8. Golub G., Kukharets S., Zavadska O., Marus O. Determination of the rate of organic biomass decomposition in biogas reactors with periodic loading. – International Journal of Renewable Energy Research, 2019, vol. 9, no. 4, 1741-1750. [http://www.ijrer.org/ijrer/index.php/ijrer/article/view/10163](https://www.ijrer.org/ijrer/index.php/ijrer/article/view/9557/pdf)
9. G. Golub, S. Kukharets, O. Skydan, Y. Yarosh, V. Chuba, V. Golub. The optimization of the gasifier recovery zone height when working on straw pellets. – International Journal of Renewable Energy Research, 2020, vol. 10, no. 2, 529-536. [http://www.ijrer.org/ijrer/index.php/ijrer/article/view/10547](https://www.ijrer.org/ijrer/index.php/ijrer/article/view/9557/pdf)
10. G. Golub, V. Chuba, N. Tsyvenkova, O. Marus, Y. Yarosh. Bioenergy potential of Ukrainian agriculture. – International Journal of Renewable Energy Research, 2021, vol. 11, no. 3, 1223-1229.
11. G. Golub, N. Tsyvenkova, V. Golub, V. Chuba, I. Omarov, A. Holubenko. Determining the effect of the structural and technological parameters of a gas blower unit on the air flow distribution in a gas generator. – Eastern-European Journal of Enterprise Technologies, 2022, 4/8 (118), Energy-saving technologies and equipment, 29-43.
12. Golub, G., Tsyvenkova, N., Yaremenko, O., Marus, O., Omarov, I., & Нolubenko A. (2023). Determining the efficiency of installing fixed solar photovoltaic modules and modules with different tracking options. Eastern-European Journal of Enterprise Technologies, 4(8 (124), 15–25. https://doi.org/10.15587/1729-4061.2023.286464

### Course Timetable

|  |  |  |  |
| --- | --- | --- | --- |
| **Lecture** | **Date and Time** | **Instructor** | **Venue** |
| 1st | 23.04.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 2nd | 23.04.2024,  15:10 – 16:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 3rd | 30.04.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 4th | 30.04.2024,  16:50 – 18:10 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 5th | 07.05.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 6th | 14.05.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 7th | 21.05.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| 8th | 28.05.2024,  10:10 – 11:30 | Prof. Gennadii GOLUB | <https://zoom.us/j/92794927668?pwd=ZnFzbW1wQUt1K3JZejliRkpmWTNsZz09> |
| **Summarizing. Presentation of certificates to graduates.** | 21.06.2024  10:10 – 11:30 | Prof. Gennadii GOLUB  Prof. Viacheslav BRATISHKO  Assoc. Prof. Zinovii RUZHILO | building 11,  library reading room |

**The 1-st group**

|  |  |  |  |
| --- | --- | --- | --- |
| **Seminars, practice or laboratory work** | **Date and Time** | **Instructor** | **Venue** |
| 1st | 26.04.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 2nd | 26.04.2024,  15:10 – 16:30 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 3rd | 03.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 4th | 03.05.2024,  15:10 – 16:30 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 5th | 10.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 6th | 17.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 7th | 24.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 8th | 31.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |

**The 2-nd group**

|  |  |  |  |
| --- | --- | --- | --- |
| **Seminars, practice or laboratory work** | **Date and Time** | **Instructor** | **Venue** |
| 1st | 23.04.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 2nd | 23.04.2024,  15:10 – 16:30 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 3rd | 30.04.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 4th | 30.04.2024,  15:10 – 16:30 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 5th | 07.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 6th | 14.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 7th | 21.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |
| 8th | 28.05.2024,  13:30 – 14:50 | Researcher  Anna Holubenko | Polissia National University,  classroom 312 |

### Contact Details of Instructor(s)

|  |  |  |
| --- | --- | --- |
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