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|--|---|--|-------------|------|-----------------|-------------|
| Field of study | Aquaculture and Fisheries | | | | | |
| Mode of study | stationary | Level | first cycle | | | |
| Graduate's qualification | inżynier | | | | | |
| Fields of science | agricultural sciences | | | | | |
| Disciplines of science | animal science and fisheries (100%) | | | | | |
| Educational profile | general academic | | | | | |
| Module | | | | | | |
| Course unit | Aquaponics | | | | | |
| Code | WNOZIR/AQF/S1/ | | | | | |
| Field of specialisation | | | | | | |
| Administering faculty | Department of Aquatic Bioengineering and Aquaculture | | | | | |
| ECTS | 6.0 | ECTS (forms) | 6.0 | | | |
| Form of course credit | examination | Language | english | | | |
| Electives | 8 | Elective group | | | | |
| Form of instruction | Cod | Semester | Hours | ECTS | Weight | Credit |
| laboratory course | L | 5 | 30 | 3.0 | 0.50 | credits |
| lecture | W | 5 | 30 | 3.0 | 0.50 | examination |
| Leading teacher | Sadowski Jacek (Jacek.Sadowski@zut.edu.pl) | | | | | |
| Other teachers | Biernaczyk Marcin (Marcin.Biernaczyk@zut.edu.pl), Sadowski Jacek (Jacek.Sadowski@zut.edu.pl) | | | | | |
| Prerequisites | | | | | | |
| W-1 | students taking classes in the basics of aquaponics should have basic knowledge in the field of environmental biology including ichthyology, hydrochemistry, biochemistry, body physiology, mathematics and biophysics | | | | | |
| Module/course unit objectives | | | | | | |
| C-1 | The objective is to give relevant knowledge about principles of design recirculation aquaculture systems which using aquaponics systems for purification of waste water; and basal biological rules of functioning recirculation aquaculture/aquaponics systems | | | | | |
| Course content divided into various forms of instruction | | | | | Number of hours | |
| T-L-1 | System components and system design | | | | 16 | |
| T-L-2 | Basic calculation | | | | 14 | |
| T-W-1 | Introduction to aquaponics | | | | 10 | |
| T-W-2 | Biological and hydrochemical principles of RAS and aquaponics | | | | 10 | |
| T-W-3 | The rearing and cultivation of individual species of fish and plants | | | | 10 | |
| Student workload - forms of activity | | | | | Number of hours | |
| A-L-1 | participation in classes | | | | 30 | |
| A-L-2 | preparation of project | | | | 60 | |
| A-W-1 | preparation for passing the course | | | | 30 | |
| A-W-2 | participation in classes | | | | 60 | |
| Teaching methods / tools | | | | | | |
| M-1 | lecture | | | | | |
| M-2 | didactic discussion related to the lecture | | | | | |
| M-3 | movie | | | | | |
| M-4 | a show combined with an experience | | | | | |
| M-5 | subject exercises using a computer | | | | | |
| Evaluation methods (F - progressive, P - final) | | | | | | |
| S-1 | F | the assessment is carried out on the basis of tests - the so-called entrance materials from previous classes - the average grade is 30% of the final grade | | | | |
| S-2 | P | at the end of the course, a test is carried out covering all the issues discussed in the class - it accounts for 70% of the final grade for the subject | | | | |
| S-3 | F | the assessment is carried out on the basis of a correctly presented design | | | | |



Evaluation methods (F - progressive, P - final)

| | | |
|-----|---|---|
| S-4 | P | assessment of social competences is not quantified in a normal society - the teacher's task is not to de facto evaluate someone's worldview - it can only be considered (or not) that the student has become familiar with a specific approach - in this case I do not assess |
|-----|---|---|

| Designed learning outcomes | Reference to the learning outcomes designed for the fields of study | Reference to Learning Outcomes for qualifications at PQF 6, 7 or 8 | Reference to learning outcomes for qualifications at level 6 or 7 that enable acquiring engineering competences | Course objectives | Course content | Teaching methods | Evaluation methods |
|----------------------------|---|--|---|-------------------|----------------|------------------|--------------------|
|----------------------------|---|--|---|-------------------|----------------|------------------|--------------------|

Knowledge

| | | | | | | | |
|---|------------|--------|--------|-----|-------------------------|--------------------------|------------|
| AQF_1A_C20a_W01 Has knowledge of the basic farming techniques used in aquaponics | AQF_1A_W04 | P6S_WG | P6S_WG | C-1 | T-L-1 T-W-1 T-W-2 | M-1 M-2 M-3 M-4 | S-1 S-2 |
| AQF_1A_C20a_W02 Knows the methods of breeding selected species of aquatic animals and plants, with particular emphasis on the area of Europe | AQF_1A_W08 | P6S_WG | | C-1 | T-W-3 | M-1 M-2 M-3 M-4 | S-1 S-2 |
| AQF_1A_C20a_W03 knows the calculation methods used in aquaponics | AQF_1A_W03 | P6S_WG | P6S_WG | C-1 | T-L-1 T-L-2 | M-5 | S-3 |

Skills

| | | | | | | | |
|---|------------|--------|--------|-----|-------------------------|------------|-----|
| AQF_1A_C20a_U01 can make basic calculations regarding selected aquaponics techniques | AQF_1A_U07 | P6S_UW | | C-1 | T-L-1 T-W-1 T-W-2 | M-5 | S-3 |
| AQF_1A_C20a_U02 is able to recognize selected species of fish and plants in aquaponics and select an appropriate breeding technique for them | AQF_1A_U16 | P6S_UW | P6S_UW | C-1 | T-W-3 | M-4 M-5 | S-3 |
| AQF_1A_C20a_U03 knows the basics of using computer programs used in aquaponics | AQF_1A_U07 | P6S_UW | | C-1 | T-L-1 T-L-2 | M-4 M-5 | S-3 |

Social competences

| | | | | | | | |
|---|------------|------------------|--|-----|----------------|-----|-----|
| AQF_1A_C20a_K01 understands the importance of ethical and social aspects related to the breeding of aquatic organisms | AQF_1A_K02 | P6S_KO P6S_KR | | C-1 | T-W-1 | M-2 | S-4 |
| AQF_1A_C20a_K02 is aware of the impact of human activities in the field of aquatic animal breeding on the shaping and condition of the aquatic environment | AQF_1A_K04 | P6S_KK | | C-1 | T-W-1 T-W-3 | M-2 | S-4 |

| Outcomes | Grade | Evaluation criterion |
|----------|-------|----------------------|
|----------|-------|----------------------|

Knowledge

| | | |
|-----------------|-----|---|
| AQF_1A_C20a_W01 | 2,0 | |
| | 3,0 | Knows basic farming techniques used in aquaponics |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |
| AQF_1A_C20a_W02 | 2,0 | |
| | 3,0 | knows some methods of breeding selected species of aquatic animals and plants |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |
| AQF_1A_C20a_W03 | 2,0 | |
| | 3,0 | knows some calculation methods used in aquaponics |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |

Skills

| | | |
|-----------------|-----|---|
| AQF_1A_C20a_U01 | 2,0 | |
| | 3,0 | can make some basic calculations for selected aquaponics techniques |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |



Skills

| | | |
|-----------------|-----|--|
| AQF_1A_C20a_U02 | 2,0 | |
| | 3,0 | the student recognizes only a few species and is able to assign them breeding techniques |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |
| AQF_1A_C20a_U03 | 2,0 | |
| | 3,0 | the student knows some of the elements of operating computer programs |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |

Other social competences

| | | |
|-----------------|-----|--------------------------------------|
| AQF_1A_C20a_K01 | 2,0 | |
| | 3,0 | grades are not formulated as degrees |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |
| AQF_1A_C20a_K02 | 2,0 | |
| | 3,0 | grades are not formulated as degrees |
| | 3,5 | |
| | 4,0 | |
| | 4,5 | |
| | 5,0 | |

Required reading

1. Goddek S., Joyce A., Kotzen B., Gavin M. Burnell E, Aquaponics food Production Systems, Springer Open, 2019

Supplementary reading

1. różni, aquaponics website and magazines, 2020