

STUDY GUIDE

# Aquaponics

SHORT COURSE





# HOW TO WORK THROUGH THIS COURSE

Over the following pages, you will move through a logical, self-paced learning experience that can enlighten and educate you on Aquaponics.

It is important from the outset to understand that learning about something is not the same as just reading about it. Learning implies a permanent change in what you know and can do.

Anyone can read a book and understand it; but for most people the detail of what you read is largely forgotten.

Reading something once only puts information into short-term memory. It is soon lost if you don't 'work' on it. Studying the same information takes longer, but by thinking about it and processing it you can transfer that information to long-term memory. This way, you will enhance your ability to recall and apply that information for years to come. If you take your time to work through the 5 lessons that follow, you will learn.

**HOW DOES THIS COURSE WORK?**

**WATCH THIS VIDEO FIRST**

<https://vimeo.com/441179158>

## Read, Reflect, Research, Revise

Throughout the following pages, you will find not only things to read about, but also things to do:

1. Throughout each lesson, there are suggestions of things to do under the headings "Learn More". These are all sorts of ideas about things you can do in order to explore the subject further.
2. At the end of each lesson, there is an interactive self assessment test (assignment), for you to undertake. When you click on this, your computer needs to be online. You will be taken to our cloud-based online school. The answers you choose will be evaluated immediately, and your results can be seen on completion of each test. You can return and repeat tests if you wish.

Undertaking these tasks will involve reflection, research and revision of the topics you read about. By repeatedly encountering each topic in different ways, your perspective on each subject will broaden, and the commitment of information to longer term memory will strengthen.

You don't need to undertake all of the suggested tasks if you don't want to; but we strongly recommend that you do some in each lesson, and that you take all of the self-assessment tests.

The more time you spend doing these things, the stronger your learning will be.

## Completing the Course

After completing all 5 lessons you will be presented with a final assessment which can also be undertaken online.

Do not attempt to do this until you have worked through all 5 lessons, and feel like you have learnt the subject well.

Upon finishing this final assessment you will immediately see your final results, and you can save a pdf copy of those results as a "Certificate of Completion".

## Welcome Audio

Click the button below to listen to the welcome audio for this course. This feature is supported by most computers and some mobile devices.



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# LESSON 1 SCOPE AND NATURE OF AQUAPONICS

Aquaponics is a way of combining aquaculture or fish farming, with hydroponic growing. This is typically achieved by using the waste from fish tanks to fertilize plants, and waste water from plants to top up water in the fish tanks. The tricky part is to ensure that water taken from plants to fish, is chemically suitable for the fish, and that water taken from fish to plants is chemically appropriate for growing plants.

The nutrient-rich waste from fish tanks can be valuable as plant food to vegetables and herbs grown in hydroponic beds. Chemicals (including nutrients) naturally increase in any water in which fish or other aquatic animals live. Some of these chemicals (such as

ammonia) are the result of excrement from the animals, and others may result from decomposition of dead animal tissue or left over food. As a result of its nutrient composition, water that is used for aquaculture is a useful source of nutrition for growing plants.

## Suggested Tasks: ▼

*Throughout this course you will be provided with suggested tasks and reading to aid with your understanding. These will appear in the right hand column. Remember: these tasks are optional. The more you complete, the more you will learn, but in order to complete the course in 20 hours you will need to manage your time well. We suggest you spend about 10 minutes on each task you attempt, and no more than 20 minutes.*



Golden Perch (*Macquaria ambigua*) is one of a number of freshwater fish species that have been grown successfully in aquaponics.



In hydroponics you don't use soil to grow plants - instead materials like gravel, perlite, river pebbles/stones, lava rock (e.g. pumice stones), clay pebbles or rockwool may be used to anchor plants

into specifically designed, channel-like beds (usually raised at a convenient height). Water (with dissolved nutrients added) constantly reticulates through the beds.



Floating Gardens are the simplest form of aquaponics. Rafts are created to hold a growing media. Plants grow in the media. Provision must be made for water to either be absorbed through the bottom of the raft, up into the root zone; or for the root mass to penetrate through the bottom into the water. Example. A fly mesh bottom, and a media above that is mostly peat moss or sphagnum moss. Moisture will be absorbed up into the moss, keeping the roots wet.

Floating gardens of any size can be used in large ponds, dams or lakes; to grow certain types of plants.

This photo illustrates a small one, growing "Impatiens". Large floating gardens were established and used hundreds of years ago, by native people in Mexico; growing food crops on floating Islands. With fish in the water below, these were perhaps early examples of "aquaponics".

In aquaculture fish is farmed under controlled or partly controlled conditions. Water quality needs to be carefully managed (e.g. faeces from fish might be filtered out and/or dissolved and passed through a tank or tanks where bacteria can convert any excessive ammonia to nitrites then nitrates, before applying the nitrate rich solution to the plant roots).

Aquaponics can be used on a small scale or large and either commercially, or to grow food for your own use at home. Either way, both fish and plants benefit each other by creating a symbiotic relationship to produce a sustainable and integrated aquaponic system, which can yield produce all year long as long as it is in a suitably controlled environment.

## LEARN MORE >>>

### Suggested Tasks

Write down your own definitions of:

- Aquaculture
- Hydroponics
- Aquaponics

Now go online and search for definitions of each of these terms.

Compare these to your own definitions and make note of any differences.

## WHAT GROWS WELL IN AQUAPONICS?

- Plants such as leafy green vegetables, vine plants, fruit and fruit trees, flowers, grasses and seaweed all grow well in aquaponics.
- Freshwater fish and other aquatic animals (e.g. crayfish) can be grown.
- The easier plants and animals to grow will be the ones that are less sensitive to variations in water conditions (e.g. pH, nutrient levels).

Generally speaking, plants that don't demand such high nutritional levels will survive and thrive best in most aquaponic systems. These include: common house plants; leafy crops such as kale, lettuce, pak choi; and herbs such as mint, basil, watercress, among many others. However, all others can grow strongly and vigorously too if the aquaponic system is well established and accurately monitored.

It is advised that the variety of plants and fish you choose to grow meet similar pH and temperature standards in order to benefit from a more successful production.



An example of small scale hydroponics. If you add fish into the black tub that contains nutrient solution, this would become “aquaponics”. It becomes tricky though when choosing a compatible species of fish, and maintaining an appropriate level of plant nutrients in the water. Overcoming incompatibilities is the challenge of aquaponics.