BOARD OF THE
NATIONAL DIPLOMA IN BEEKEEPING

THE NATIONAL DIPLOMA IN BEEKEEPING SYLLABUS

INTRODUCTION

This syllabus is intended to encourage beekeepers to acquire a greater knowledge and skill in the husbandry of honey bees in the British Isles.

This is to be achieved through an understanding of the biology of the honey bee and honey bee colony, their requirements, the threats facing them and the ecosystem services they provide. The threats include the complex challenges of future climate change and changing weather patterns.

The broad scope of the syllabus does not imply that candidates are expected to recall every aspect of every subject in exhaustive detail.

Candidates should nevertheless demonstrate a sound working knowledge across the full syllabus, together with an appropriate advanced understanding of the principal concepts and current issues, sound practical judgement, the ability to connect different areas of knowledge and the application of relevant evidence to practical situations.

The syllabus covers all the states of the honey bee *(Apis mellifera)* found in the British Isles including wild, managed and feral colonies.

Candidates should also note that while the syllabus is primarily concerned with beekeeping in the British Isles the candidate will be expected to be knowledgeable about any developments that take place elsewhere with respect to *Apis mellifera* and which could have a potential impact on beekeeping in the British Isles.

1. HONEY BEE BIOLOGY

The candidate will have studied and be required to demonstrate an understanding of the following subjects:

- Honey bee anatomy – form and function
    - The anatomy and morphology of the honey bee together with their adaptations to fulfil their functions
    - Dissection of the honey bee to demonstrate aspects of their anatomy

- Development
    - The development and life cycle stages of each of the castes and their roles including the age-related (polyethism) activities of worker bees in the organisation and functioning of the honey bee colony
- Knowledge and understanding of the shelter needs for a honey bee colony to develop and thrive
- Communication between honey bees
    - The nature of pheromones in honey bees, their origins and function in a honey bee colony
    - The honey bee dance languages and demonstration of an understanding of the dance functions
    - Other forms of communication e.g. vibration
- Orientation and navigation
    - The current understanding of honey bee vision and its role in navigation and foraging behaviour
- The collection of food and other resources
    - How honey bees collect nectar, pollen, propolis and water and the behaviours they display in gaining access to the resources found in the wide variety of flower morphology. How colonies regulate the amount of foraging they undertake and how this affects nest homeostasis
- Reproduction and swarming
    - The natural history of swarming and mating behaviour in unmanaged colonies and how this compares with the swarming process and its management in today's beekeeping husbandry practices
- Supersedure
    - Understanding supersedure in the honey bee colony
    - The factors that influence supersedure in colonies and its significance

- Drones, queens and workers
    - The basis for the genetic determination of drones, queens and worker bees
    - The theory and practice of honey bee breeding and queen raising
    - The mechanism of genetic and environmental factors in honey bee variation
    - The influence of honey bee genetics on honey bee selective breeding.

2. HONEY BEE HEALTH – THE PESTS AND DISEASES THAT POSE A THREAT TO HONEY BEES IN THE BRITISH ISLES

The candidate will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- The requirements of a honey bee colony to maintain a healthy status
- Understanding the principles of integrated bee health management (IBHM) and integrated pest management (IPM) and how they can be applied by beekeepers in routine and emergency situations
- The characteristics and behaviours of healthy and unhealthy colonies
- Brood diseases and conditions, diagnosis, treatment, efficacy assessment and control
- Adult bee diseases and conditions, diagnosis, treatment, efficacy assessment and control
- Mites that may affect honey bees, both endemic and those that pose future threats and the mitigating actions available
- Honey bee viruses and their changing impact and the mitigating actions available
- Honey bee pests and predators, now and in the future, and the mitigating actions available
- Principles and practices of apiary hygiene and other strategies to minimise the burden of honey bee disease on the colony
- Recognition of the threat, the possible routes of invasion of exotic pests and predator species to honey bees
- Awareness of the threats to key honey bee forage crops in the British Isles and what arrangements are in place to monitor such threats relevant to beekeeping
- Understanding the role of Government Agencies in relation to honey bee health and recognising the variations between the devolved administrations
- Understanding the current strategies to tackle exotic pests and diseases and what actions a beekeeper might have to consider should the pests, diseases and threats become established

- The varroa mite (*Varroa destructor*)*, Tropilaelaps* mites, small hive beetle (*Aethina tumida*) and the yellow legged Asian hornet (*Vespa velutina nigrithorax*) are important species for study and demonstration of knowledge by the candidate.

3. OTHER FACTORS THAT CAN IMPACT HONEY BEE COLONY HEALTH

The candidate will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- An awareness of other organisms sometimes found in and around honey bee colonies and beehives
- The use and potential for the misuse of chemical substances in the management of pests, diseases and conditions in honey bees
- The influence of treatments used in farming, horticulture, gardening and other land management practices on honey bee health.

4. HONEY BEE NUTRITION

The candidate will have studied and be required to demonstrate an understanding of the following subjects:

- The difference between the terms ‘nutrition’ and ‘feeding’
- The key nutrients required for growth, reproduction and existence in the honey bee at both the individual and the colony level
- The gross carbohydrate and protein nutritional requirements of the honey bee colony’s annual cycle and how these are met
- The sources of the key nutritional materials such as carbohydrates, proteins, essential amino acids, vitellogenin, fatty acids, lipids, sterols, vitamins, minerals and water
- A basic understanding of the importance and nature of the honey bee gut (micro) biome
- The influence of nutrition on honey bee colony resistance to diseases, pests and other stressors
- The management of honey bee colonies to optimise honey bee health through nutritional inputs, such as supplements.

5. BEEKEEPING IN THE BRITISH ISLES

The candidate will have studied and be required to demonstrate an understanding of the following subjects:

- The structure of beekeeping (hobbyist, small scale and commercial) in the British Isles, including officially available estimates of the regional and national colony numbers and beekeepers
- The basis of the current legal status of honey bees and beekeepers and elements of the law, including knowledge of the regulatory controls relating to apiculture and small-scale beekeeping and hive products in the British Isles
- The representation of beekeepers through beekeeping associations and other bodies and recognition of the fact that not all beekeepers are members of beekeeping associations.

6. THE DIVERSITY OF APPROACHES TO HONEY BEE HUSBANDRY IN THE 21ST CENTURY

The candidate will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- The various approaches commonly described as high input commercial beekeeping, traditional beekeeping, natural beekeeping, sustainable beekeeping, treatment-free, organic beekeeping in colony management systems and their advantages and disadvantages
- An awareness of aspects of these various husbandry approaches which might prove valuable in future years resulting from the effects of weather and climate changes
- An understanding of these various approaches and their implications for
    - The beekeeping year
    - Colony reproduction and swarming
    - Colony nutrition
    - Individual bee and colony health
    - The management and control of honey bee pests and diseases
    - The exploitation of the honey bee for human needs, i.e. human needs and ecosystem services
    - The broader ecological implications of honey bee management systems.

7. VETERINARY MEDICINES, CHEMICAL SUBSTANCES, TREATMENTS AND PRACTICAL BEEKEEPING

The candidate will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- The regulation and control of veterinary products for application to honey bees as bee medicines in the British Isles
- The regulation and control of chemical substances which are used in practical beekeeping but are not currently licensed as veterinary medicines, including the potential of unintended effects on honey bee health and function in the British Isles
- The regulation and control of crop protection products in the British Isles including the potential for unintended effects on honey bee health and function
- The regulation and control of veterinary products for application to honey bees as bee medicines in the British Isles
- The conditions under which pesticides are regulated for use in the eradication of free-living honey bee colonies.

8. BEEKEEPING EQUIPMENT

The candidate will be expected to have:

- Studied the wide range of beekeeping equipment currently used by British beekeepers
- Have an awareness of the beekeeping equipment industry in the British Isles
- A record of visits which may be made to beekeeping equipment suppliers and equipment manufacturers should be kept and included in the candidate's beekeeping portfolio
- Taken advantage of opportunities to use different kinds of equipment noting their features, together with their pros and cons in use
- To critically assess their potential for practical benefits to beekeeping as they come to the market. Candidates should be prepared to have an opinion on equipment and aids to husbandry practices.

9. HEALTH AND SAFETY IN BEEKEEPING

- The candidate is expected to be able to identify those hazards (i.e. the possible sources of danger) and consider the risk (possibility of suffering harm or danger, including fire, physical injury, misuse of treatment products, lone working) of beekeeping in various scenarios. Actions that can mitigate the risks should be identified
- Typical scenarios include:
    - Inside the home
    - At locations where beekeeping related activities are taking place
    - In the apiary
    - In a third-party location
    - The movement of beehives
    - Demonstrations at association events and shows
    - In the event of someone being stung, including actions required in the event of anaphylaxis
- The candidate should have a basic understanding of Public Liability Insurance and beekeeping and what a typical policy should include.

10. PRIMARY HONEY BEE PRODUCTS

The candidate will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- Materials which are harvested and marketed in the British Isles. These include
    - Honey
    - Pollen
    - Wax
    - Propolis
- The areas of study should include their physical properties, composition, harvesting and preparation and use, and where relevant their sale
- Specifically for honey, the candidate should be able to demonstrate an appreciation of the issue of honey adulteration and the implications for consumer confidence and health. This includes a knowledge of honey regulation and sale in the British Isles

- To assist in this, candidates are expected to be able to comment on honey samples and be able to discern, as far as it is possible by visual inspection, a wholesome sample of honey fit to be placed on the market
- Candidates will be aware of the processes involved in honey extraction and preparation for scale in both large and small scale operations and if possible a visit to a commercial operation
- Such visits should be recorded in the beekeeper's portfolio of beekeeping experience.

11. HONEY BEES AND ECOSYSTEM SERVICES

Candidates will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- The interdependence of plants, honey bees and other pollinators
- The biology of flowering plants and the relationship with the honey bee in terms of food sourcing, availability and pollination
- The key role honey bees play in making possible the wide and varied human diet through their pollination activities in the British Isles and elsewhere
- The role of pollinators and specifically the role of honey bees in food production
- The interaction of the honey bee genome and how it interacts with the environment
- The candidate will be expected to demonstrate an understanding of those insect orders and their contribution to biodiversity mainly through pollination ecosystem services, and their own biodiversity including:
    - Hymenoptera
    - Diptera
    - Lepidoptera
    - Coleoptera
    - Hemiptera
- Candidates should be aware of examples of those orders that are of significance to the honey bee.

12. IMPACTS OF WEATHER AND CLIMATE CHANGE

Candidates will have studied and be required to demonstrate knowledge and understanding of the following subjects:

- The weather and climate and how the various components of these might impact on such matters as:
    - The biology of the honey bee and colony life cycle
    - The availability of forage and the provision of shelter to meet colony needs
    - Potential changes in current pest and honey bee disease status and how the colony and the beekeeper will respond
    - Longer term impacts of climate on practical beekeeping as a whole.

13. TECHNOLOGY, LITERATURE AND INFORMATION

Candidates will be expected to demonstrate the following:

- An awareness of and ability to use word processing, digital photography (e.g. using mobile phones) and presentation software such as Power Point
- The potential use of these resources for outreach and communication programmes
- The ability to set up and use both low power dissecting microscopes and compound microscopes
- An awareness of the use of smart hive monitoring technologies
- An awareness of beekeeping information in traditional (i.e. printed) sources and the internet and utilising such resources to develop skills to critically appraise and differentiate high quality information and advice from that of poor quality
- An awareness of other new technologies relevant to beekeeping.