USEARCH
Ultra-fast sequence analysis

High-throughput search and clustering
USEARCH is a unique sequence analysis tool with thousands of users world-wide. USEARCH offers search and clustering algorithms that are often orders of magnitude faster than BLAST.

Improved productivity and insights
USEARCH combines many different algorithms into a single package with outstanding documentation and support. This cuts your learning curve, reduces the number of steps you need to take for a given task, and slashes compute times. USEARCH will encourage you to explore your data, enabling new insights and suggesting new analyses that you might not have tried with slower tools.

Free for most users
Licenses to use 32-bit USEARCH are offered at no charge for all users, including commercial.
OTU analysis

Reads

Clustering (UPARSE)

Read processing
Chimeras
OTU generation

OTU sequences

>Otul
GATTAGCTCATTCGTA
>Otul
TTCGTAGATTAGCTCA
>Otul
...

OTU table

Taxonomy prediction (UTAX)

Diversity analysis (QIIME, mothur...)

GATTAGCTCATTCGTA
TTCGTAGATTAGCTCA
Six commands

- Three hours of lectures, six commands
- Few minutes to process millions of MiSeq reads

1. Merge pairs
   ```bash
   $usearch -fastq_mergepairs ../fq/F3D*_R1_*.fastq -fastqout $out/merged.fq \
   -relabel @ -log $out/merge.log
   ```

2. Quality filter
   ```bash
   $usearch -fastq_filter $out/merged.fq -fastq_maxee 1.0 -fastaout $out/filtered.fa \
   -relabel Filt -log $out/filter.log
   ```

3. Find uniques
   ```bash
   $usearch -derep_fulllength $out/filtered.fa -sizeout -relabel Uniq \
   -fastaout $out/uniques.fa -log $out/derep.log
   ```

4. Cluster & filter chimeras
   ```bash
   $usearch -cluster_otus $out/uniques.fa -minsize 2 -otus $out/otus.fa \
   -relabel Otu -log $out/cluster_otus.log
   ```

5. Predict taxonomy
   ```bash
   $usearch -utax $out/otus.fa -db ../utax/utax_16s_250.udb -strand plus \
   -fastaout $out/otus_tax.fa -utax_cutoff 0.9 -log $out/utax.log
   ```

6. Make OTU table
   ```bash
   $usearch -usearch_global $out/merged.fq -db $out/otus_tax.fa -strand plus -id 0.97 \
   -log $out/make_otutab.log -otutabout $out/otutab.txt
   ```