

===== REPEAT 1/5 =====

Starting 5-fold CV (3-train / 1-val / 1-test) on 398 samples...

===== Outer Fold 1 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

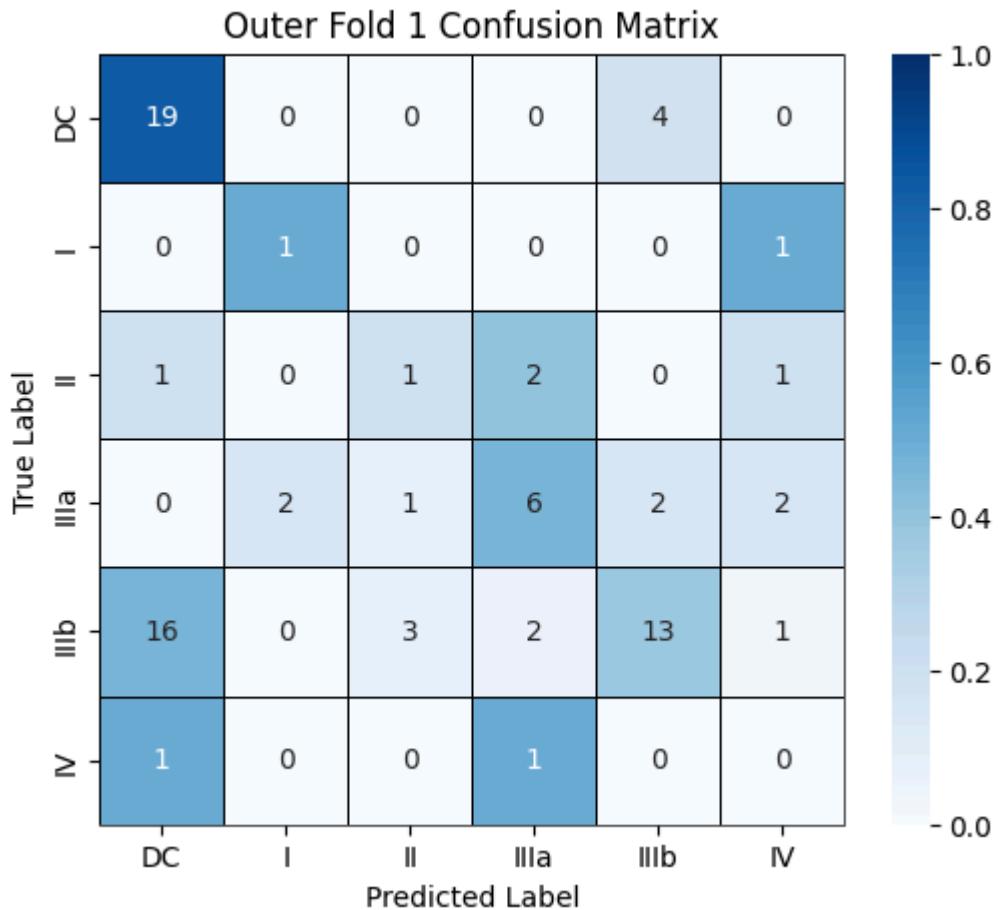
DC	0.5135	0.8261	0.6333	23
I	0.3333	0.5000	0.4000	2
II	0.2000	0.2000	0.2000	5
IIIa	0.5455	0.4615	0.5000	13
IIIb	0.6842	0.3714	0.4815	35
IV	0.0000	0.0000	0.0000	2

accuracy		0.5000	80	
macro avg	0.3794	0.3932	0.3691	80
weighted avg	0.5564	0.5000	0.4965	80

Balanced Accuracy: 0.39317566491479533

Confusion Matrix:

```
[[19  0  0  0  4  0]
 [ 0  1  0  0  0  1]
 [ 1  0  1  2  0  1]
 [ 0  2  1  6  2  2]
 [16  0  3  2 13  1]
 [ 1  0  0  1  0  0]]
```



===== Outer Fold 2 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

DC	0.7333	0.9565	0.8302	23
I	0.2500	0.6667	0.3636	3
II	0.2500	0.2000	0.2222	5
IIIa	0.2941	0.4167	0.3448	12
IIIb	0.7368	0.4000	0.5185	35
IV	0.5000	0.5000	0.5000	2

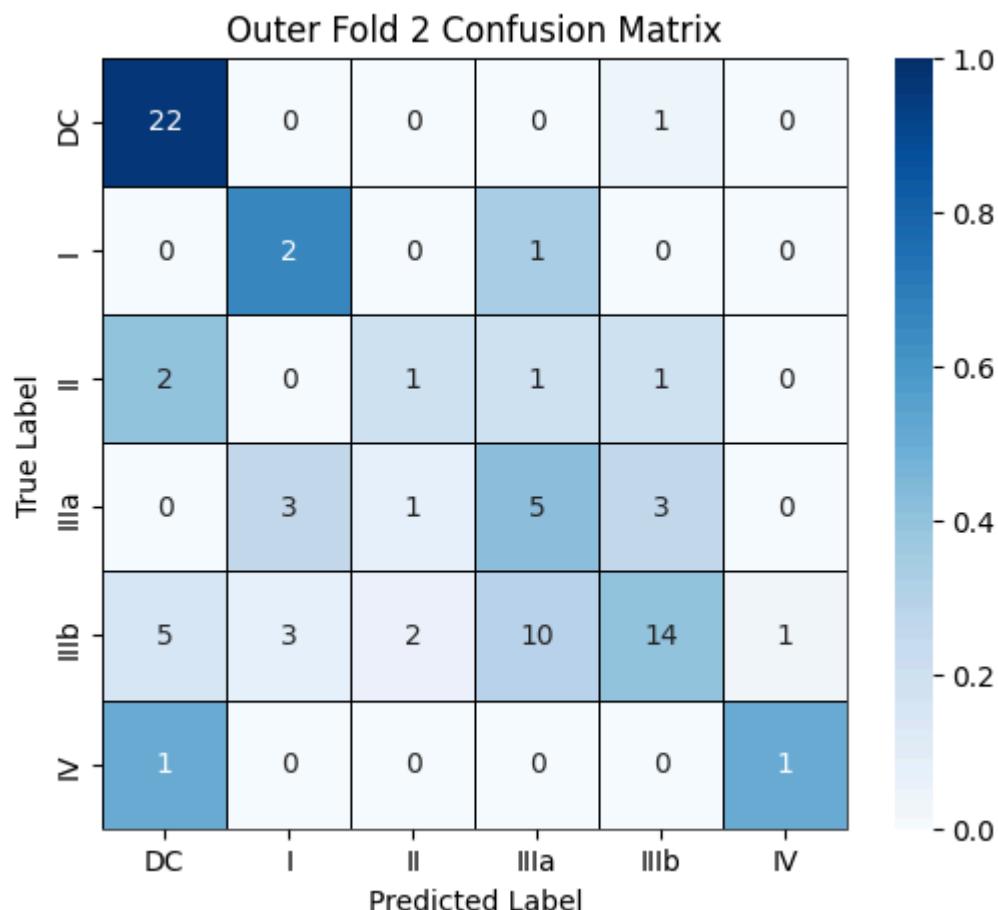
accuracy	0.5625	80		
macro avg	0.4607	0.5233	0.4632	80
weighted avg	0.6148	0.5625	0.5573	80

Balanced Accuracy: 0.5233091787439613

Confusion Matrix:

```
[[22 0 0 0 1 0]
 [0 2 0 1 0 0]
 [2 0 1 1 1 0]
 [0 3 1 5 3 0]]
```

```
[ 5 3 2 10 14 1]
[1 0 0 0 0 1]]
```



===== Outer Fold 3 =====

These features will be dropped:

['C11', 'C101', 'MC6. DP T cells', 'C64', 'C100', 'C126', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

DC	0.6296	0.7083	0.6667	24
I	0.7500	1.0000	0.8571	3
II	0.4000	0.4000	0.4000	5
IIIa	0.5000	0.6667	0.5714	12
IIIb	0.7692	0.5882	0.6667	34
IV	0.5000	0.5000	0.5000	2

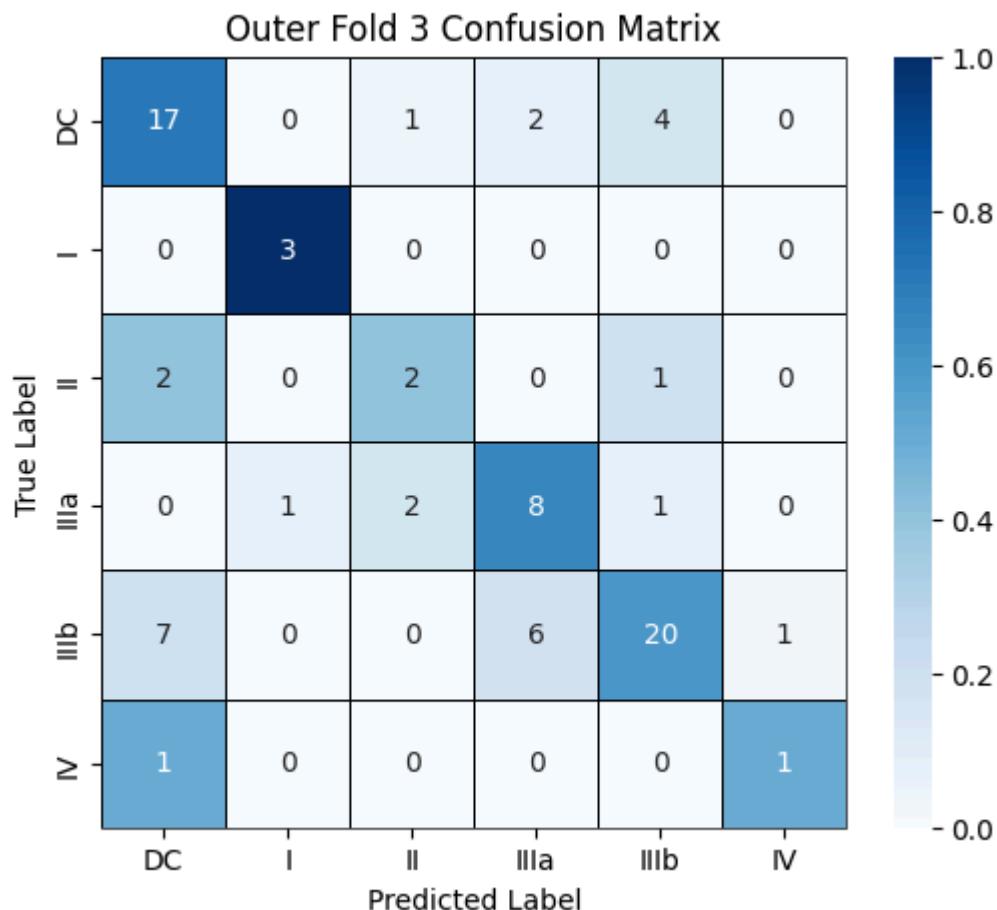
accuracy	0.6375	80		
macro avg	0.5915	0.6439	0.6103	80
weighted avg	0.6564	0.6375	0.6387	80

Balanced Accuracy: 0.6438725490196079

Confusion Matrix:

```
[[17 0 1 2 4 0]]
```

```
[ 0 3 0 0 0 0]
[ 2 0 2 0 1 0]
[ 0 1 2 8 1 0]
[ 7 0 0 6 20 1]
[ 1 0 0 0 0 1]]
```



===== Outer Fold 4 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

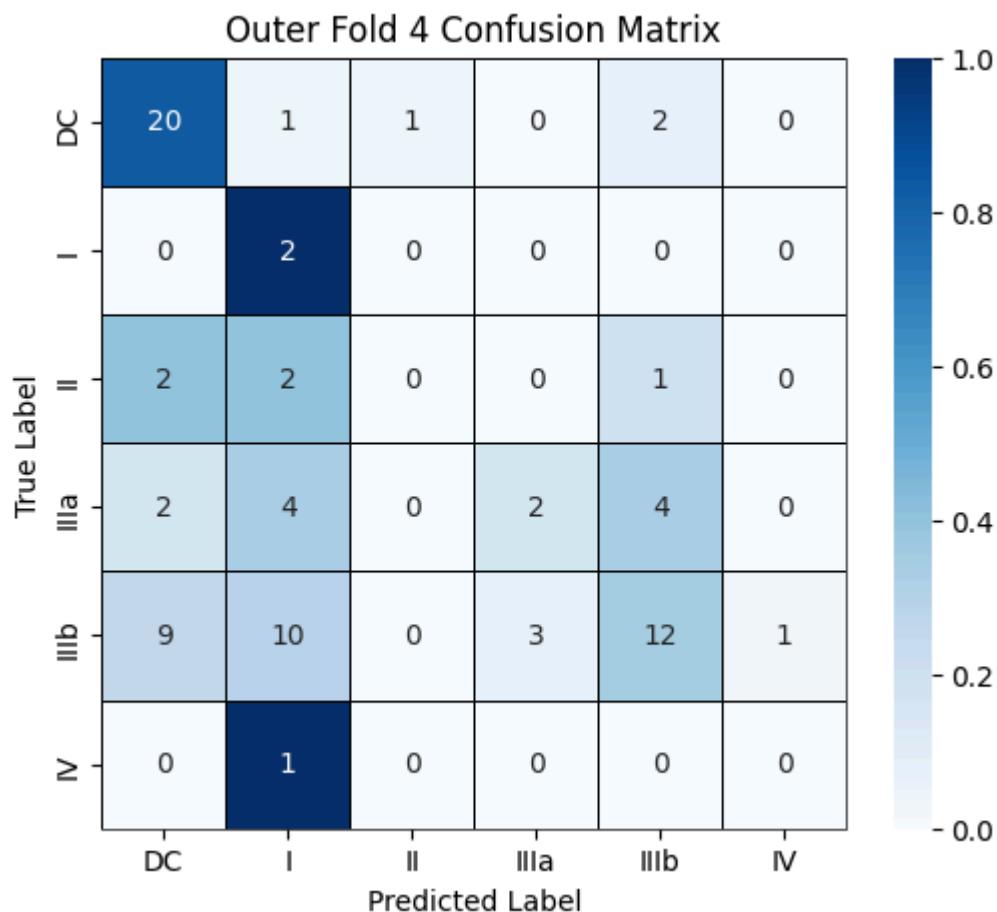
DC	0.6061	0.8333	0.7018	24
I	0.1000	1.0000	0.1818	2
II	0.0000	0.0000	0.0000	5
IIIa	0.4000	0.1667	0.2353	12
IIIb	0.6316	0.3429	0.4444	35
IV	0.0000	0.0000	0.0000	1

accuracy		0.4557		79
macro avg	0.2896	0.3905	0.2606	79
weighted avg	0.5272	0.4557	0.4504	79

Balanced Accuracy: 0.3904761904761905

Confusion Matrix:

```
[[20 1 1 0 2 0]
 [ 0 2 0 0 0 0]
 [ 2 2 0 0 1 0]
 [ 2 4 0 2 4 0]
 [ 9 10 0 3 12 1]
 [ 0 1 0 0 0 0]]
```



===== Outer Fold 5 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40',  
'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.6111	0.9167	0.7333	24
I	0.3333	0.5000	0.4000	2
II	0.3333	0.2500	0.2857	4
IIIa	0.6250	0.8333	0.7143	12
IIIb	0.8421	0.4571	0.5926	35
IV	0.5000	0.5000	0.5000	2

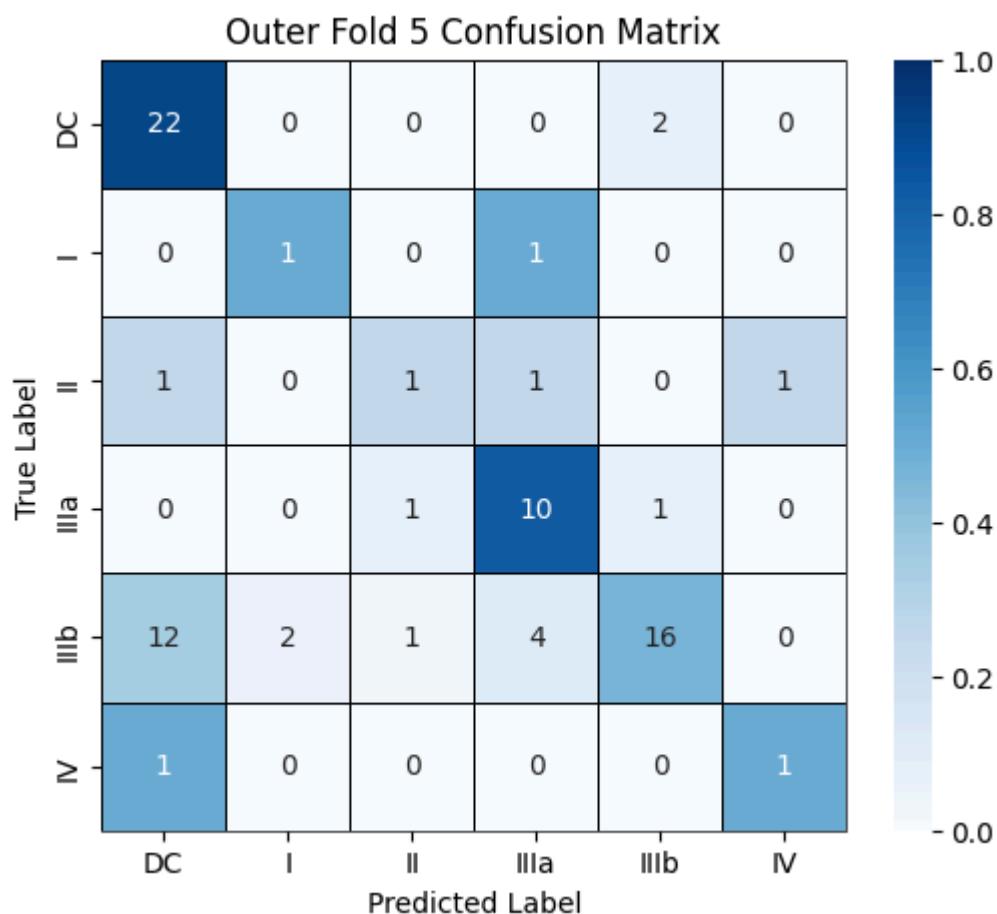
accuracy 0.6456 79

macro avg	0.5408	0.5762	0.5377	79
weighted avg	0.6917	0.6456	0.6311	79

Balanced Accuracy: 0.5761904761904763

Confusion Matrix:

```
[[22 0 0 0 2 0]
 [0 1 0 1 0 0]
 [1 0 1 1 0 1]
 [0 0 1 1 0 1 0]
 [12 2 1 4 16 0]
 [1 0 0 0 0 1]]
```



===== CV SUMMARY =====

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

DC	0.6135	0.8475	0.7117	118
I	0.2368	0.7500	0.3600	12
II	0.2778	0.2083	0.2381	24
IIIa	0.4769	0.5082	0.4921	61
IIIb	0.7353	0.4310	0.5435	174
IV	0.2500	0.3333	0.2857	9

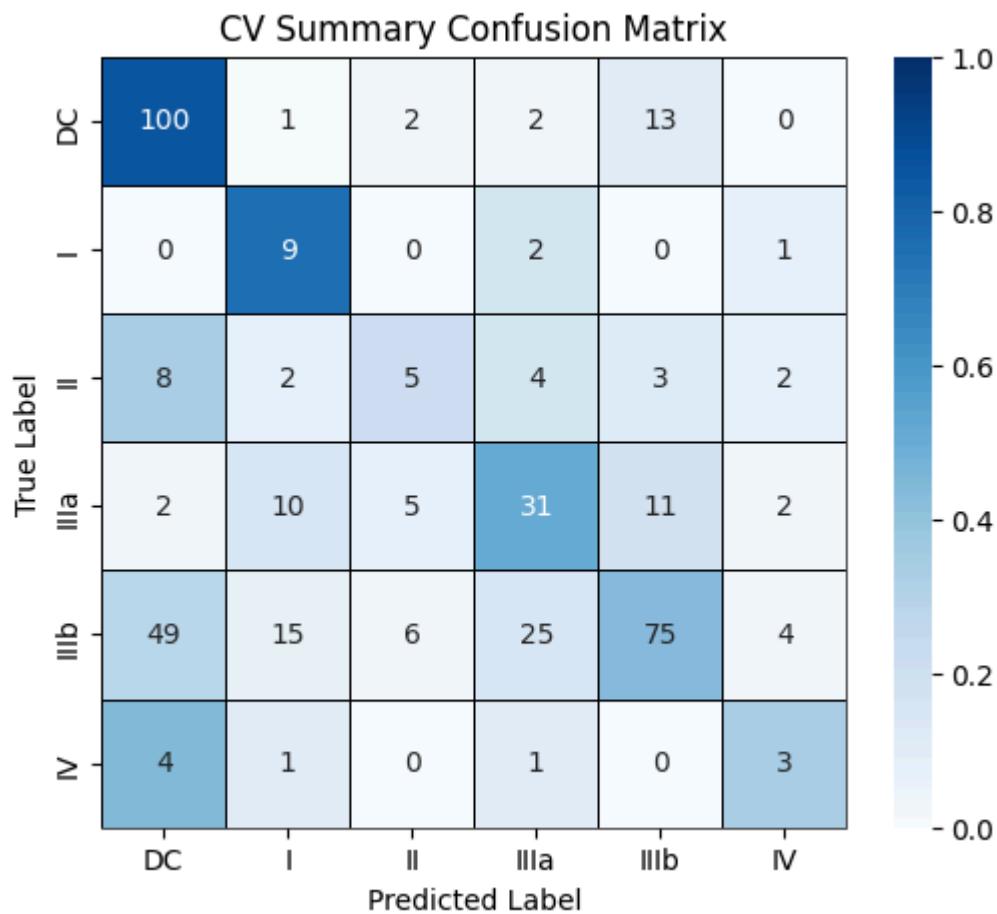
accuracy	0.5603	398
----------	--------	-----

macro avg	0.4317	0.5131	0.4385	398
weighted avg	0.6060	0.5603	0.5557	398

Balanced Accuracy: 0.5130592496425678

Confusion Matrix:

```
[[100  1  2  2 13  0]
 [ 0  9  0  2  0  1]
 [ 8  2  5  4  3  2]
 [ 2 10  5 31 11  2]
 [49 15  6 25 75  4]
 [ 4  1  0  1  0  3]]
```



===== REPEAT 2/5 =====

Starting 5-fold CV (3-train / 1-val / 1-test) on 398 samples...

===== Outer Fold 1 =====

These features will be dropped:

`['C11', 'C101', 'C64', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']`

precision recall f1-score support

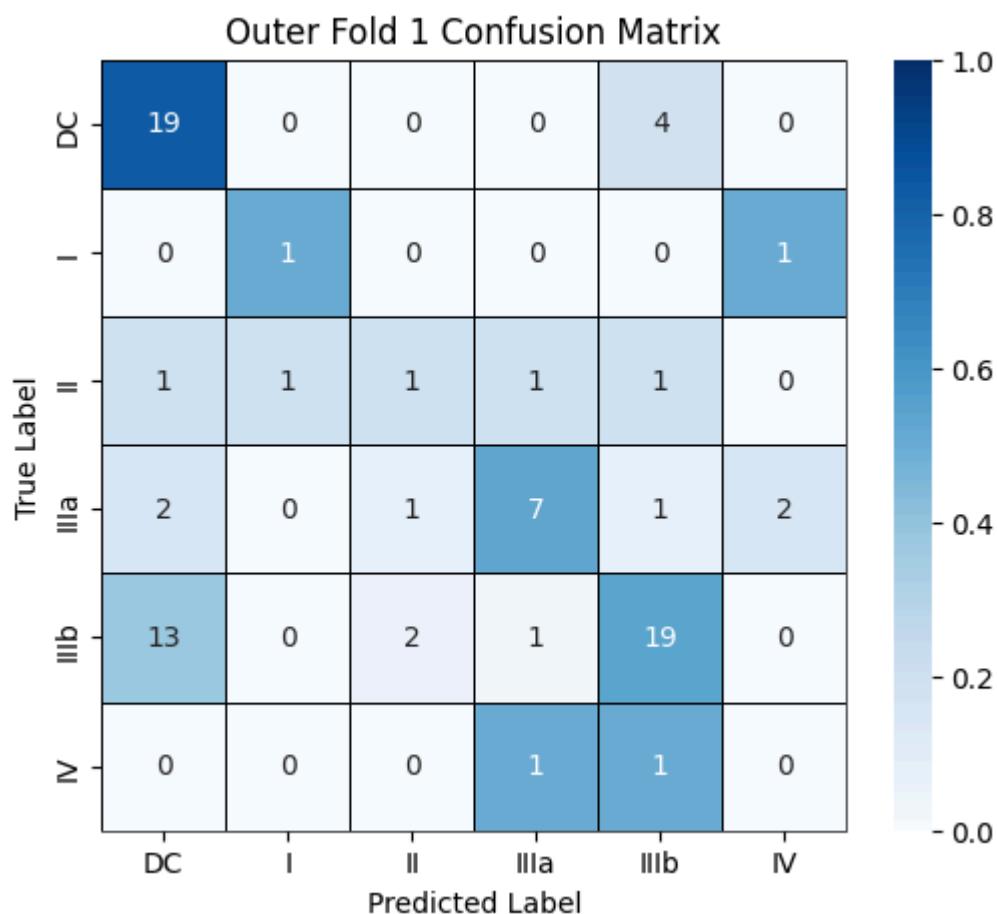
DC	0.5429	0.8261	0.6552	23
I	0.5000	0.5000	0.5000	2

II	0.2500	0.2000	0.2222	5
IIIa	0.7000	0.5385	0.6087	13
IIIb	0.7308	0.5429	0.6230	35
IV	0.0000	0.0000	0.0000	2
accuracy		0.5875	80	
macro avg	0.4539	0.4346	0.4348	80
weighted avg	0.6177	0.5875	0.5862	80

Balanced Accuracy: 0.43456760630673674

Confusion Matrix:

```
[[19 0 0 0 4 0]
 [0 1 0 0 0 1]
 [1 1 1 1 1 0]
 [2 0 1 7 1 2]
 [13 0 2 1 19 0]
 [0 0 0 1 1 0]]
```



===== Outer Fold 2 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'C127', 'C51', 'C135', 'C66']

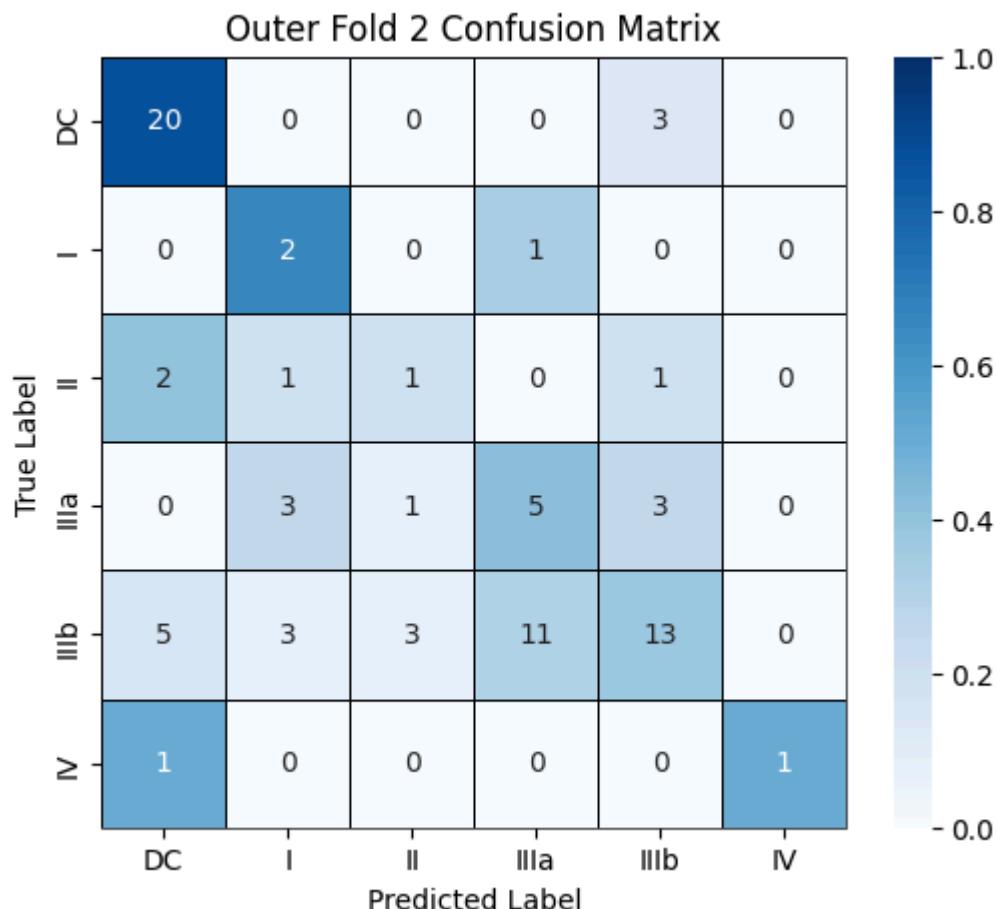
precision recall f1-score support

DC	0.7143	0.8696	0.7843	23
I	0.2222	0.6667	0.3333	3
II	0.2000	0.2000	0.2000	5
IIIa	0.2941	0.4167	0.3448	12
IIIb	0.6500	0.3714	0.4727	35
IV	1.0000	0.5000	0.6667	2
accuracy		0.5250	80	
macro avg	0.5134	0.5041	0.4670	80
weighted avg	0.5797	0.5250	0.5257	80

Balanced Accuracy: 0.5040545203588681

Confusion Matrix:

```
[[20 0 0 0 3 0]
 [0 2 0 1 0 0]
 [2 1 1 0 1 0]
 [0 3 1 5 3 0]
 [5 3 3 11 13 0]
 [1 0 0 0 0 1]]
```



===== Outer Fold 3 =====

These features will be dropped:

['C11', 'C101', 'MC6. DP T cells', 'C64', 'C100', 'C126', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']

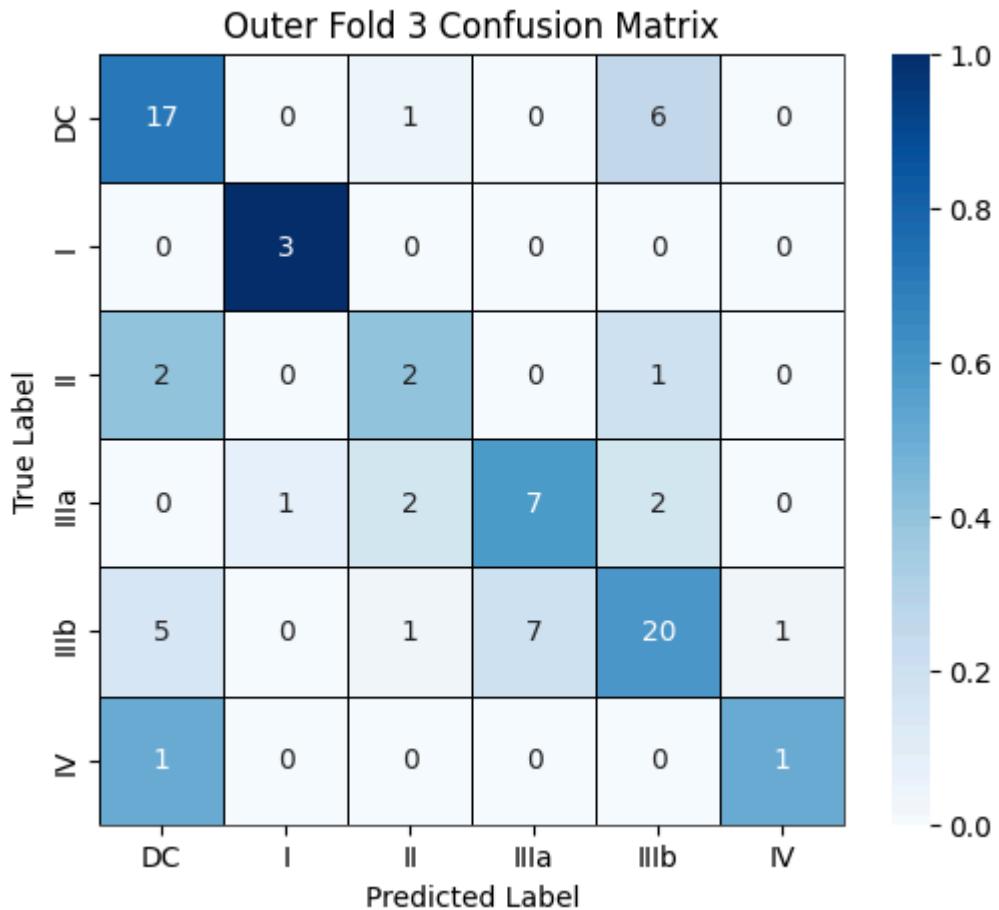
precision recall f1-score support

	DC	0.6800	0.7083	0.6939	24
I	0.7500	1.0000	0.8571	3	
II	0.3333	0.4000	0.3636	5	
IIIa	0.5000	0.5833	0.5385	12	
IIIb	0.6897	0.5882	0.6349	34	
IV	0.5000	0.5000	0.5000	2	
	accuracy		0.6250	80	
	macro avg	0.5755	0.6300	0.5980	80
	weighted avg	0.6336	0.6250	0.6261	80

Balanced Accuracy: 0.629983660130719

Confusion Matrix:

```
[[17  0  1  0  6  0]
 [ 0  3  0  0  0  0]
 [ 2  0  2  0  1  0]
 [ 0  1  2  7  2  0]
 [ 5  0  1  7 20  1]
 [ 1  0  0  0  0  1]]
```



===== Outer Fold 4 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

DC	0.6296	0.7083	0.6667	24
I	0.2500	1.0000	0.4000	2
II	0.2143	0.6000	0.3158	5
IIIa	0.5000	0.5000	0.5000	12
IIIb	0.7692	0.2857	0.4167	35
IV	0.0000	0.0000	0.0000	1

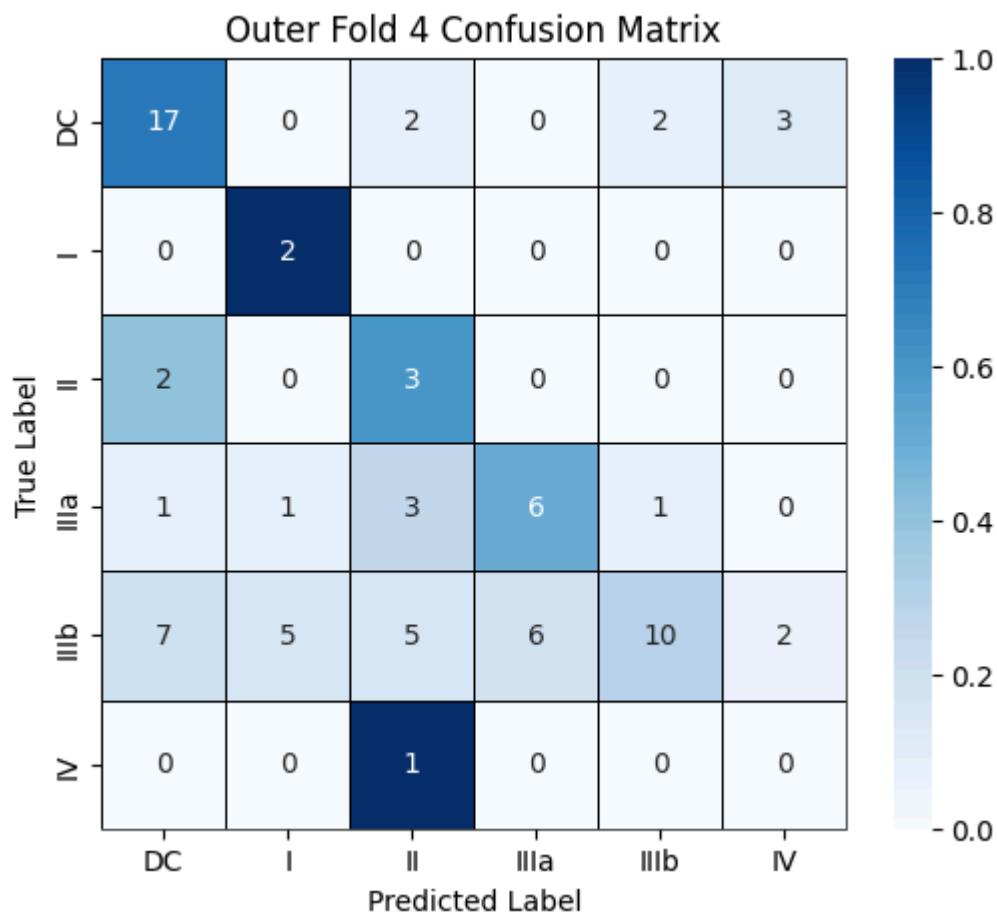
accuracy	0.4810	79		
macro avg	0.3939	0.5157	0.3832	79
weighted avg	0.6279	0.4810	0.4932	79

Balanced Accuracy: 0.5156746031746032

Confusion Matrix:

```
[[17 0 2 0 2 3]
 [0 2 0 0 0 0]
 [2 0 3 0 0 0]
 [1 1 3 6 1 0]]
```

```
[7 5 5 6 10 2]
[0 0 1 0 0 0]]
```



===== Outer Fold 5 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40',
'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.5946	0.9167	0.7213	24
I	0.5000	0.5000	0.5000	2
II	0.2500	0.2500	0.2500	4
IIIa	0.5000	0.5833	0.5385	12
IIIb	0.7619	0.4571	0.5714	35
IV	1.0000	0.5000	0.6667	2

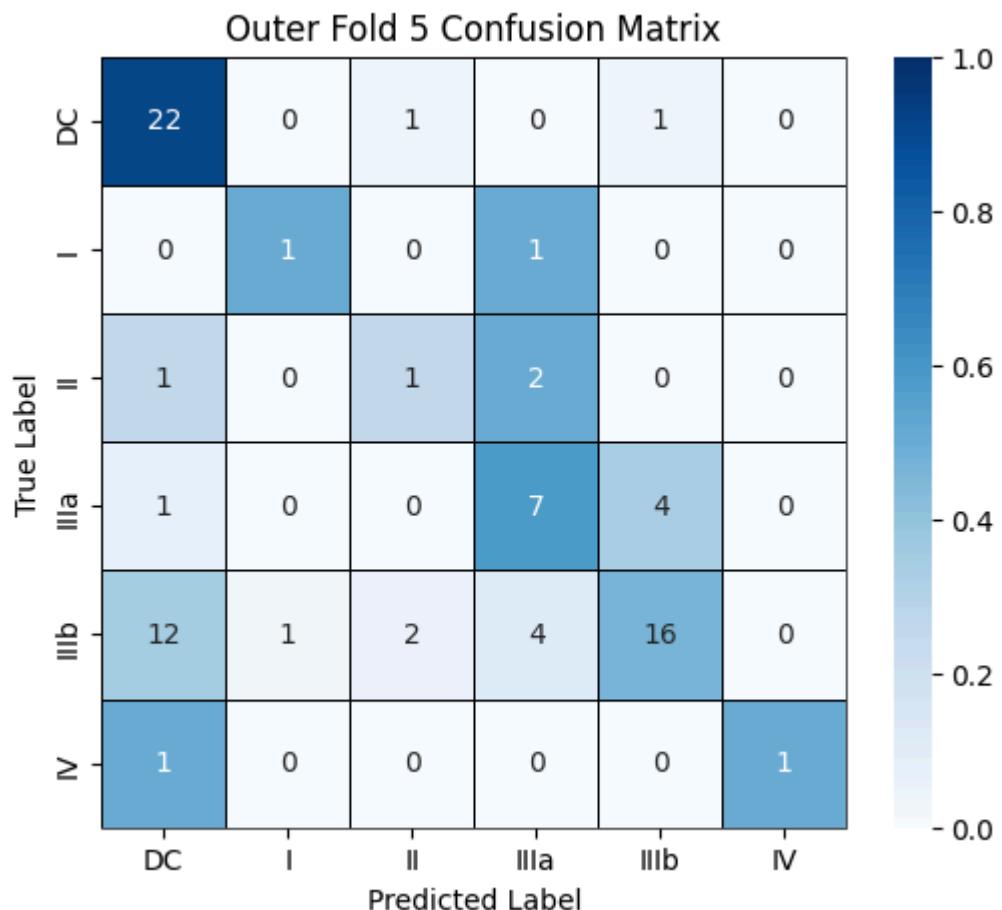
accuracy	0.6076	79		
macro avg	0.6011	0.5345	0.5413	79
weighted avg	0.6448	0.6076	0.5963	79

Balanced Accuracy: 0.5345238095238095

Confusion Matrix:

```
[[22 0 1 0 1 0]]
```

```
[ 0 1 0 1 0 0]
[ 1 0 1 2 0 0]
[ 1 0 0 7 4 0]
[12 1 2 4 16 0]
[ 1 0 0 0 0 1]]
```



===== CV SUMMARY =====

precision recall f1-score support

DC	0.6250	0.8051	0.7037	118
I	0.3600	0.7500	0.4865	12
II	0.2424	0.3333	0.2807	24
IIIa	0.4776	0.5246	0.5000	61
IIIb	0.7156	0.4483	0.5512	174
IV	0.2500	0.3333	0.2857	9

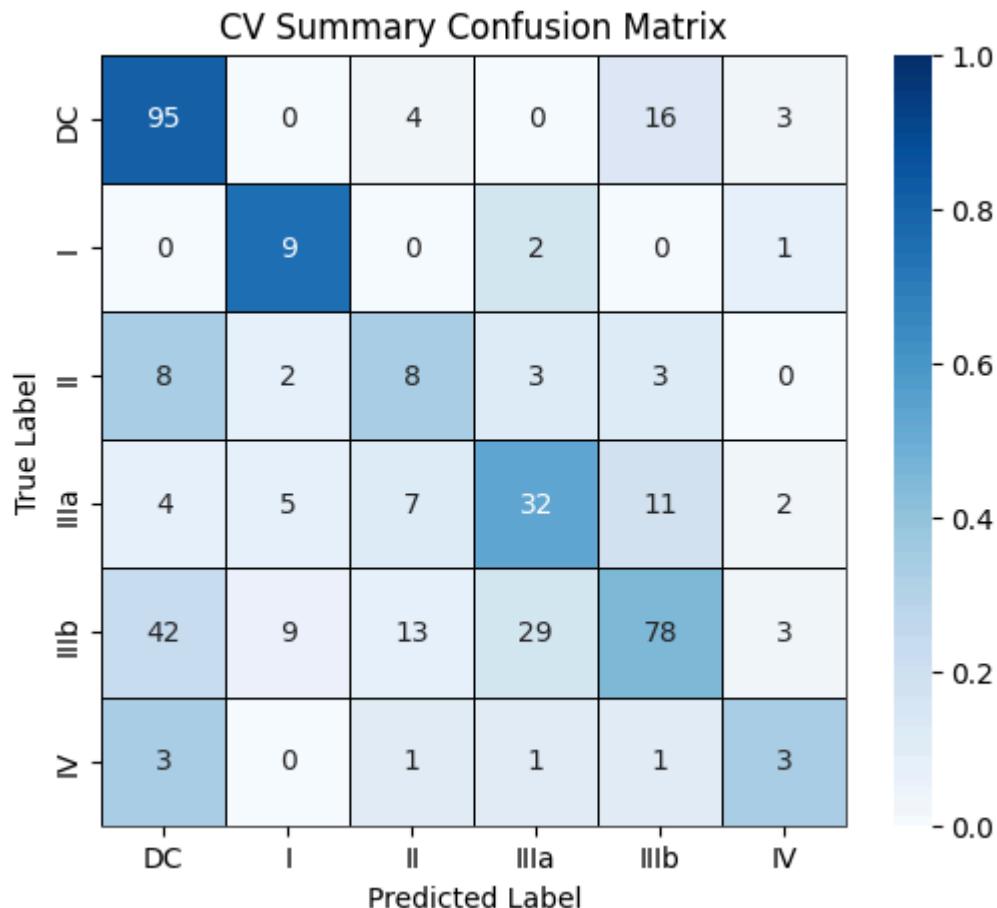
accuracy	0.5653	398		
macro avg	0.4451	0.5324	0.4680	398
weighted avg	0.6025	0.5653	0.5643	398

Balanced Accuracy: 0.5324362397387951

Confusion Matrix:

```
[[95 0 4 0 16 3]]
```

```
[ 0 9 0 2 0 1]
[ 8 2 8 3 3 0]
[ 4 5 7 32 11 2]
[42 9 13 29 78 3]
[ 3 0 1 1 1 3]]
```



===== REPEAT 3/5 =====

Starting 5-fold CV (3-train / 1-val / 1-test) on 398 samples...

===== Outer Fold 1 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86',  
'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.5556	0.6522	0.6000	23
I	0.5000	0.5000	0.5000	2
II	0.2000	0.2000	0.2000	5
IIIa	0.5500	0.8462	0.6667	13
IIIb	0.7500	0.5143	0.6102	35
IV	0.5000	0.5000	0.5000	2

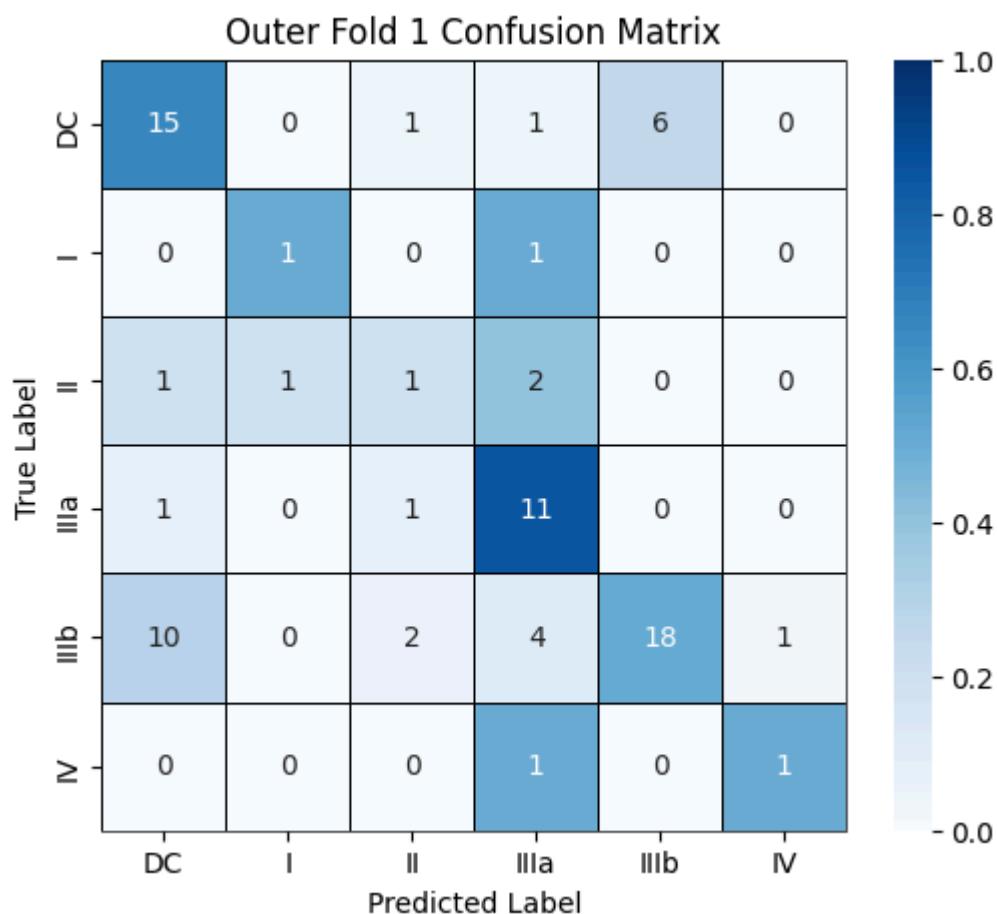
accuracy 0.5875 80

macro avg	0.5093	0.5354	0.5128	80
weighted avg	0.6147	0.5875	0.5853	80

Balanced Accuracy: 0.5354355789138397

Confusion Matrix:

```
[[15  0  1  1  6  0]
 [ 0  1  0  1  0  0]
 [ 1  1  1  2  0  0]
 [ 1  0  1  1  1  0  0]
 [10  0  2  4  18  1]
 [ 0  0  0  1  0  1]]
```



===== Outer Fold 2 =====

These features will be dropped:

`['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'C127', 'C51', 'C135', 'C66']`

precision recall f1-score support

	DC	0.6765	1.0000	0.8070	23
I	0.3333	0.6667	0.4444	3	
II	0.3333	0.4000	0.3636	5	
IIIa	0.3158	0.5000	0.3871	12	
IIIb	0.7143	0.2857	0.4082	35	

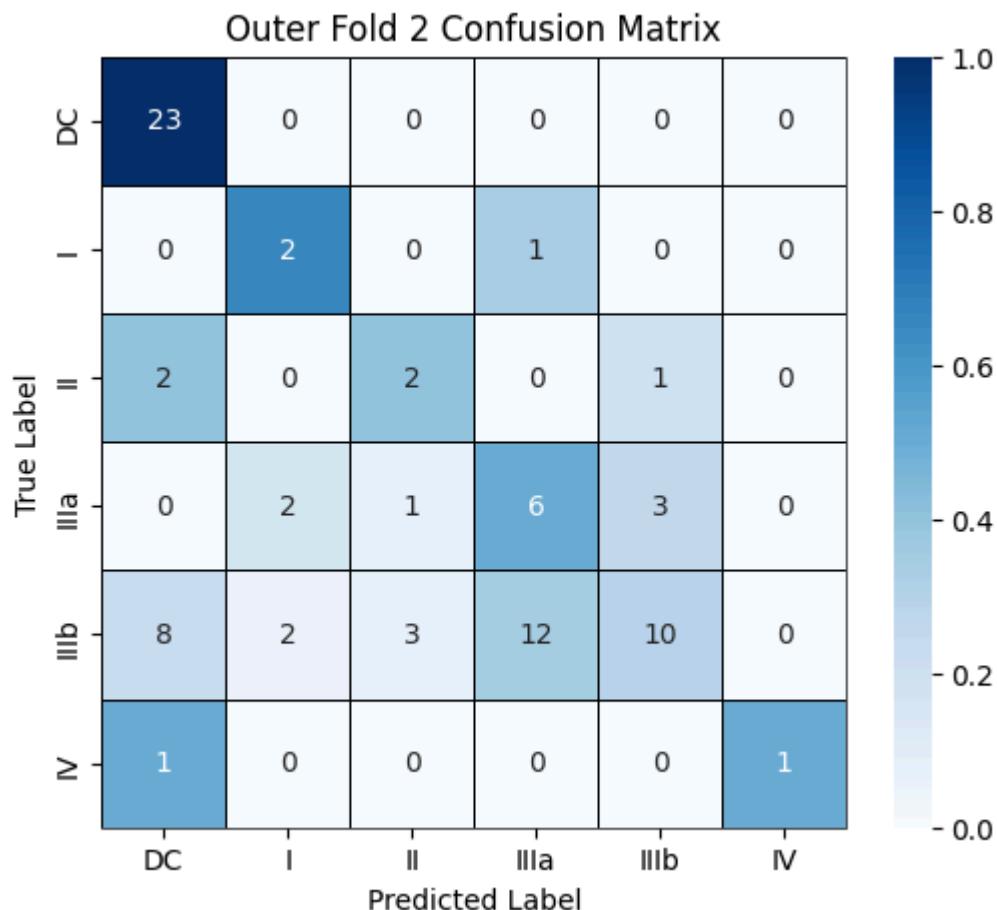
IV 1.0000 0.5000 0.6667 2

accuracy	0.5500	80		
macro avg	0.5622	0.5587	0.5128	80
weighted avg	0.6127	0.5500	0.5247	80

Balanced Accuracy: 0.5587301587301586

Confusion Matrix:

```
[[23 0 0 0 0 0]
 [0 2 0 1 0 0]
 [2 0 2 0 1 0]
 [0 2 1 6 3 0]
 [8 2 3 12 10 0]
 [1 0 0 0 0 1]]
```



===== Outer Fold 3 =====

These features will be dropped:

['C11', 'C101', 'MC6. DP T cells', 'C64', 'C100', 'C126', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

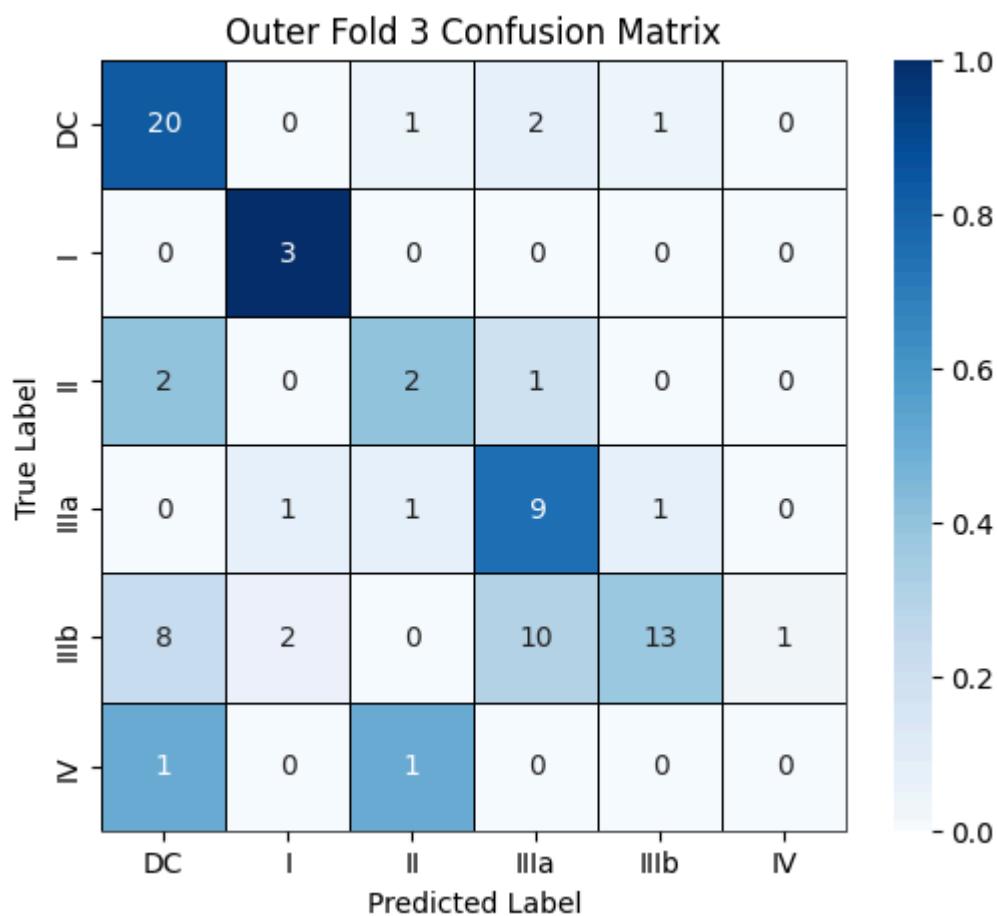
DC	0.6452	0.8333	0.7273	24
I	0.5000	1.0000	0.6667	3

II	0.4000	0.4000	0.4000	5
IIIa	0.4091	0.7500	0.5294	12
IIIb	0.8667	0.3824	0.5306	34
IV	0.0000	0.0000	0.0000	2
accuracy		0.5875	80	
macro avg	0.4702	0.5609	0.4757	80
weighted avg	0.6670	0.5875	0.5731	80

Balanced Accuracy: 0.5609477124183007

Confusion Matrix:

```
[[20 0 1 2 1 0]
 [0 3 0 0 0 0]
 [2 0 2 1 0 0]
 [0 1 1 9 1 0]
 [8 2 0 10 13 1]
 [1 0 1 0 0 0]]
```



===== Outer Fold 4 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']

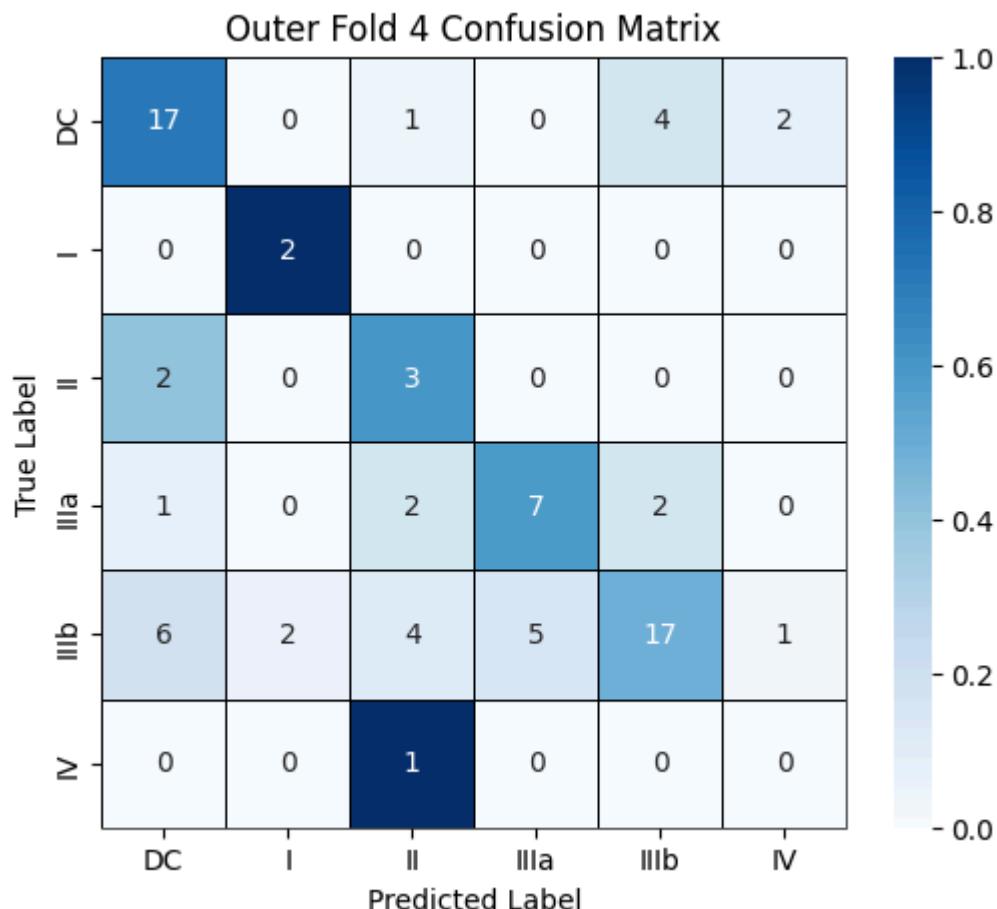
precision recall f1-score support

DC	0.6538	0.7083	0.6800	24
I	0.5000	1.0000	0.6667	2
II	0.2727	0.6000	0.3750	5
IIIa	0.5833	0.5833	0.5833	12
IIIb	0.7391	0.4857	0.5862	35
IV	0.0000	0.0000	0.0000	1
accuracy		0.5823	79	
macro avg	0.4582	0.5629	0.4819	79
weighted avg	0.6446	0.5823	0.5955	79

Balanced Accuracy: 0.5628968253968255

Confusion Matrix:

```
[[17 0 1 0 4 2]
 [0 2 0 0 0 0]
 [2 0 3 0 0 0]
 [1 0 2 7 2 0]
 [6 2 4 5 17 1]
 [0 0 1 0 0 0]]
```



===== Outer Fold 5 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']

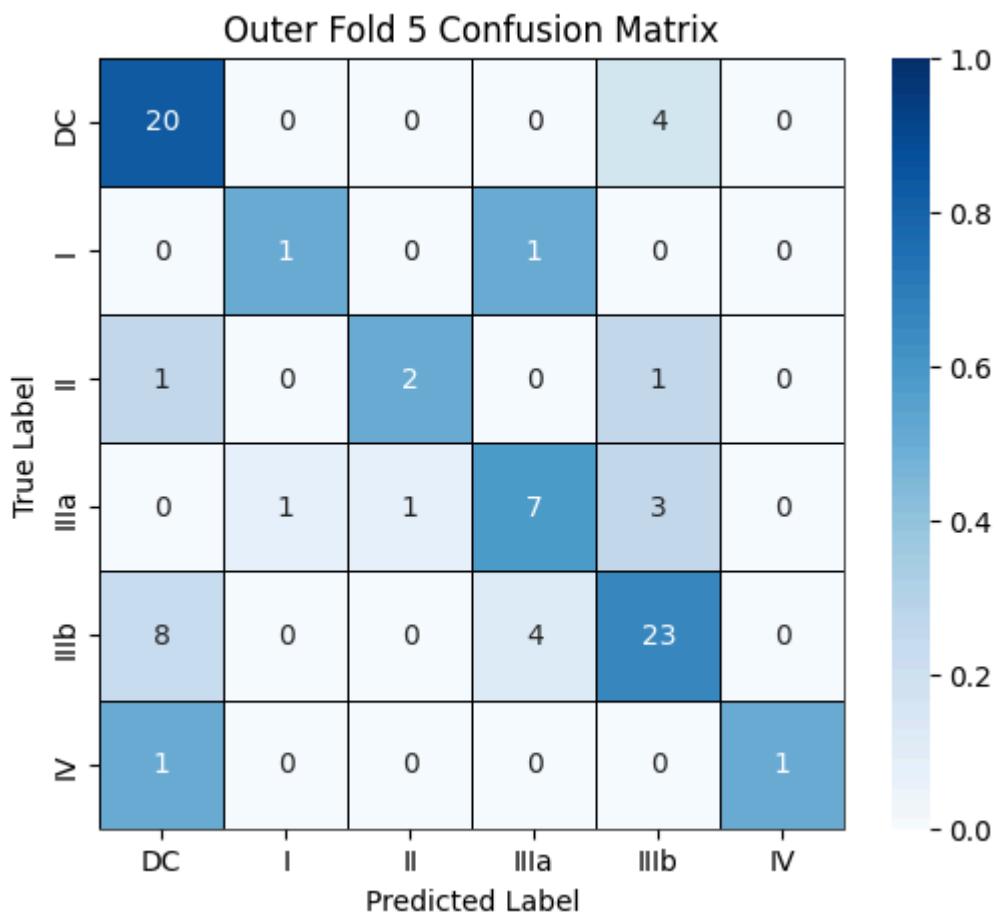
precision recall f1-score support

	DC	0.6667	0.8333	0.7407	24
I	0.5000	0.5000	0.5000	2	
II	0.6667	0.5000	0.5714	4	
IIIa	0.5833	0.5833	0.5833	12	
IIIb	0.7419	0.6571	0.6970	35	
IV	1.0000	0.5000	0.6667	2	
	accuracy		0.6835	79	
	macro avg	0.6931	0.5956	0.6265	79
	weighted avg	0.6916	0.6835	0.6809	79

Balanced Accuracy: 0.5956349206349206

Confusion Matrix:

```
[[20  0  0  0  4  0]
 [ 0  1  0  1  0  0]
 [ 1  0  2  0  1  0]
 [ 0  1  1  7  3  0]
 [ 8  0  0  4 23  0]
 [ 1  0  0  0  0  1]]
```



===== CV SUMMARY =====

precision recall f1-score support

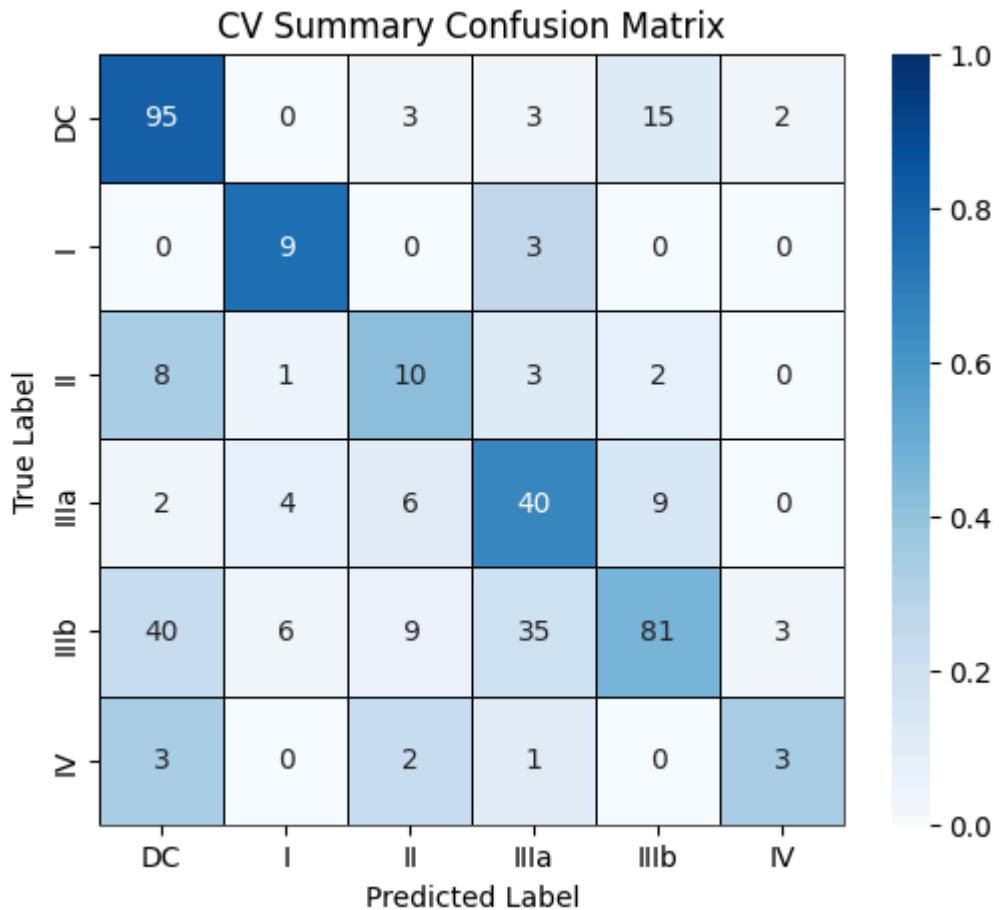
DC	0.6419	0.8051	0.7143	118
I	0.4500	0.7500	0.5625	12
II	0.3333	0.4167	0.3704	24
IIIa	0.4706	0.6557	0.5479	61
IIIb	0.7570	0.4655	0.5765	174
IV	0.3750	0.3333	0.3529	9

accuracy		0.5980	398	
macro avg	0.5046	0.5711	0.5208	398
weighted avg	0.6355	0.5980	0.5951	398

Balanced Accuracy: 0.5710566153433426

Confusion Matrix:

```
[[95 0 3 3 15 2]
 [0 9 0 3 0 0]
 [8 1 10 3 2 0]
 [2 4 6 40 9 0]
 [40 6 9 35 81 3]
 [3 0 2 1 0 3]]
```



===== REPEAT 4/5 =====

Starting 5-fold CV (3-train / 1-val / 1-test) on 398 samples...

===== Outer Fold 1 =====

These features will be dropped:

`['C11', 'C101', 'C64', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']`

precision recall f1-score support

DC	0.5455	0.7826	0.6429	23
I	1.0000	0.5000	0.6667	2
II	0.4000	0.4000	0.4000	5
IIIa	0.5882	0.7692	0.6667	13
IIIb	0.7143	0.4286	0.5357	35
IV	0.0000	0.0000	0.0000	2

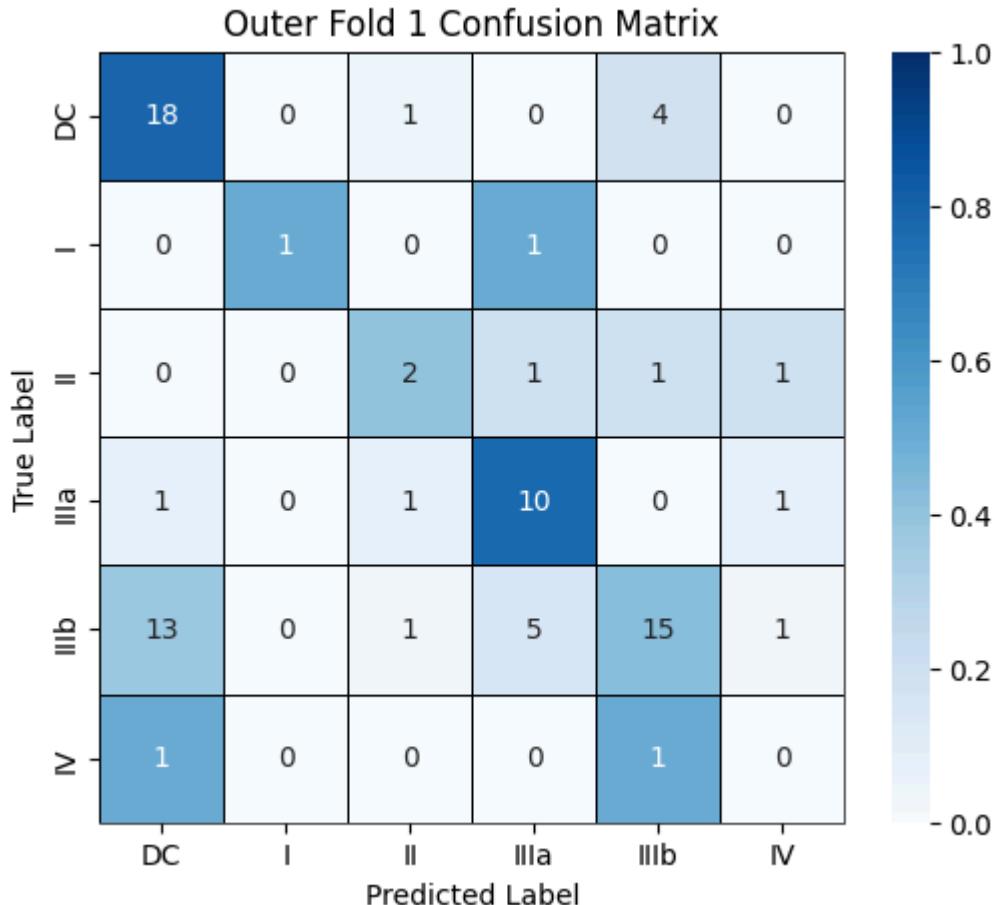
accuracy	0.5750	80		
macro avg	0.5413	0.4801	0.4853	80
weighted avg	0.6149	0.5750	0.5692	80

Balanced Accuracy: 0.48006848224239523

Confusion Matrix:

`[[18 0 1 0 4 0]]`

```
[ 0 1 0 1 0 0]
[ 0 0 2 1 1 1]
[ 1 0 1 1 0 0 1]
[13 0 1 5 15 1]
[ 1 0 0 0 1 0]]
```



===== Outer Fold 2 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

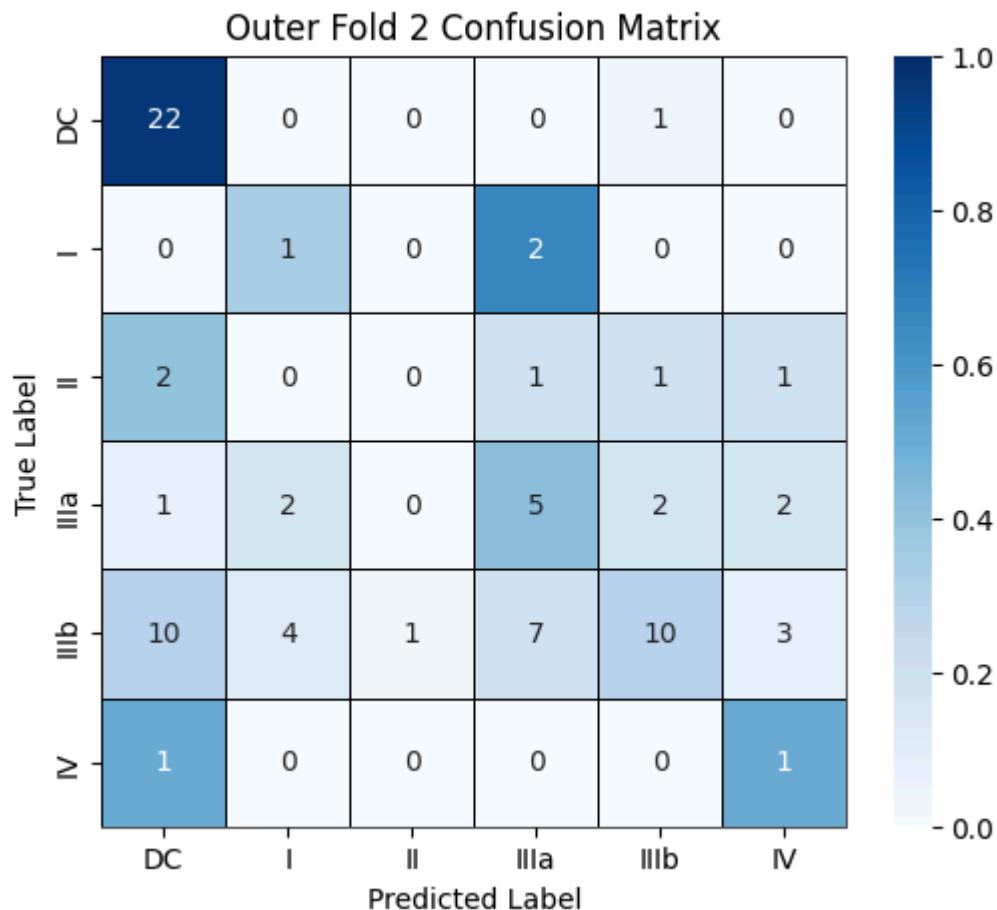
DC	0.6111	0.9565	0.7458	23
I	0.1429	0.3333	0.2000	3
II	0.0000	0.0000	0.0000	5
IIIa	0.3333	0.4167	0.3704	12
IIIb	0.7143	0.2857	0.4082	35
IV	0.1429	0.5000	0.2222	2

accuracy	0.4875	80		
macro avg	0.3241	0.4154	0.3244	80
weighted avg	0.5471	0.4875	0.4616	80

Balanced Accuracy: 0.41537267080745344

Confusion Matrix:

```
[[22 0 0 0 1 0]
 [ 0 1 0 2 0 0]
 [ 2 0 0 1 1 1]
 [ 1 2 0 5 2 2]
 [10 4 1 7 10 3]
 [ 1 0 0 0 0 1]]
```



===== Outer Fold 3 =====

These features will be dropped:

```
['C11', 'C101', 'MC6. DP T cells', 'C64', 'C100', 'C126', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86',
 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.6250	0.8333	0.7143	24
I	0.5000	1.0000	0.6667	3
II	0.2500	0.4000	0.3077	5
IIIa	0.4375	0.5833	0.5000	12
IIIb	0.7500	0.3529	0.4800	34
IV	0.0000	0.0000	0.0000	2

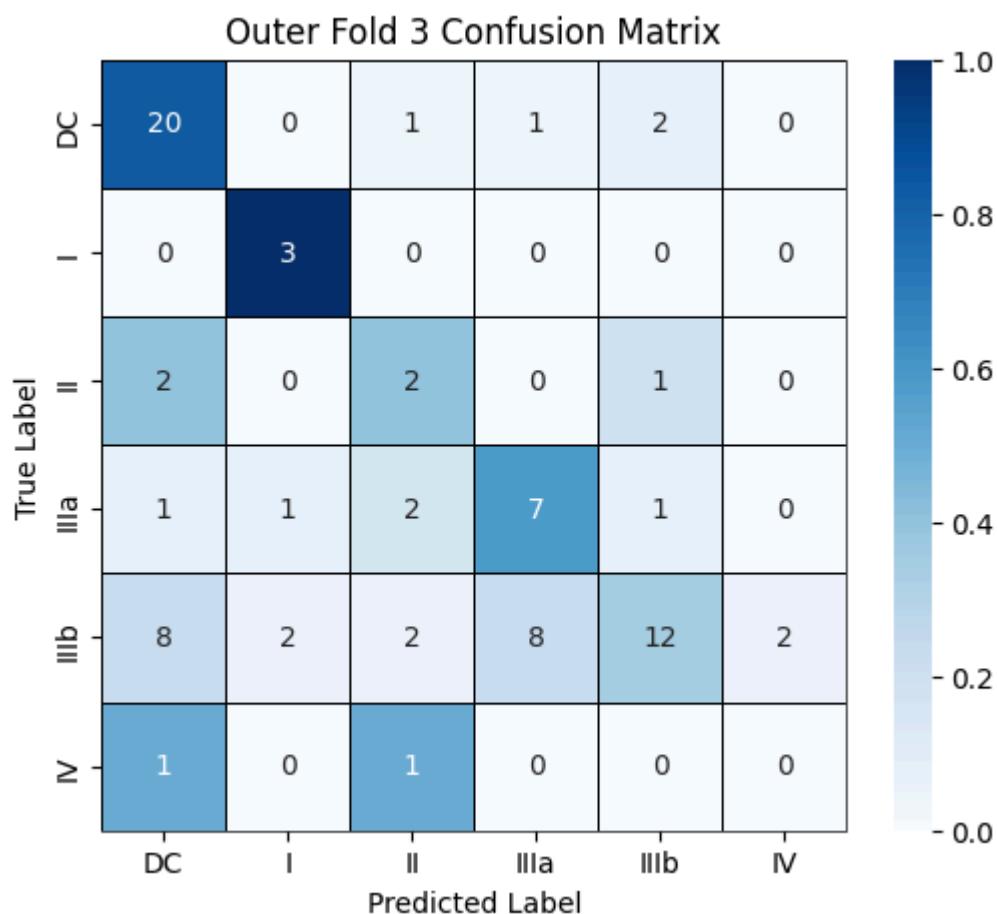
accuracy 0.5500 80

macro avg	0.4271	0.5283	0.4448	80
weighted avg	0.6062	0.5500	0.5375	80

Balanced Accuracy: 0.5282679738562092

Confusion Matrix:

```
[[20 0 1 1 2 0]
 [0 3 0 0 0 0]
 [2 0 2 0 1 0]
 [1 1 2 7 1 0]
 [8 2 2 8 12 2]
 [1 0 1 0 0 0]]
```



===== Outer Fold 4 =====

These features will be dropped:

`['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']`

precision recall f1-score support

DC	0.5926	0.6667	0.6275	24
I	0.2222	1.0000	0.3636	2
II	0.1667	0.4000	0.2353	5
IIIa	0.5000	0.4167	0.4545	12
IIIb	0.8421	0.4571	0.5926	35

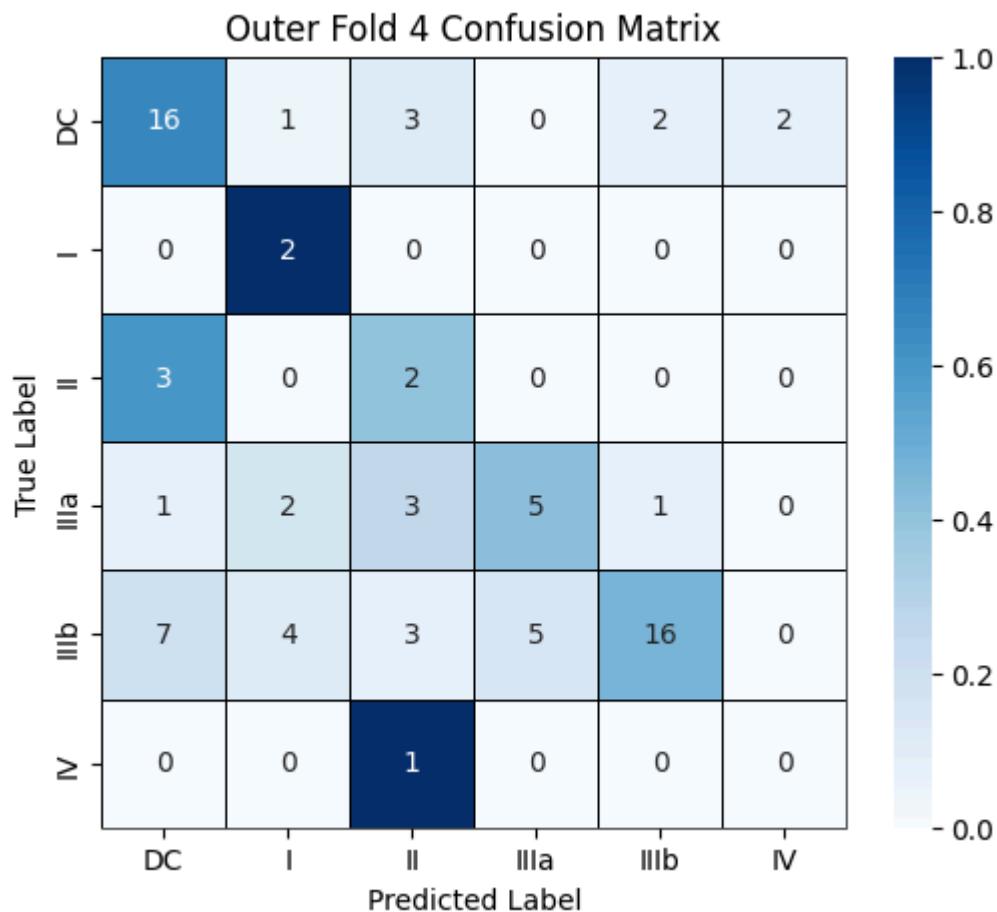
IV 0.0000 0.0000 0.0000 1

accuracy 0.5190 79
macro avg 0.3873 0.4901 0.3789 79
weighted avg 0.6452 0.5190 0.5463 79

Balanced Accuracy: 0.49007936507936506

Confusion Matrix:

```
[[16 1 3 0 2 2]
 [0 2 0 0 0 0]
 [3 0 2 0 0 0]
 [1 2 3 5 1 0]
 [7 4 3 5 16 0]
 [0 0 1 0 0 0]]
```



===== Outer Fold 5 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

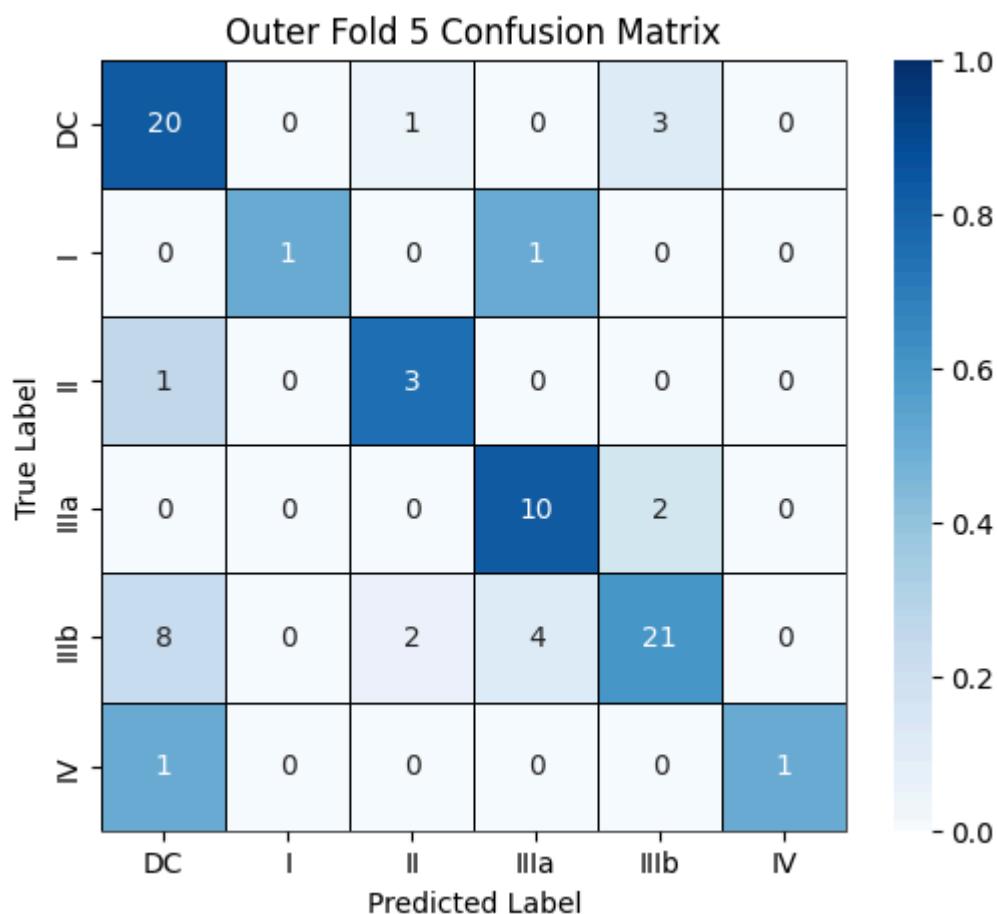
	DC	I	II	IIIa	IIIb	IV
precision	0.6667	1.0000	0.8333	0.7407	0.5000	0.6667
recall	0.6667	0.5000	0.8333	0.7407	0.6667	0.6667
f1-score	0.6667	0.6667	0.8333	0.7407	0.5000	0.6667
support	24	2	2	2	2	2

II	0.5000	0.7500	0.6000	4
IIIa	0.6667	0.8333	0.7407	12
IIIb	0.8077	0.6000	0.6885	35
IV	1.0000	0.5000	0.6667	2
accuracy		0.7089	79	
macro avg	0.7735	0.6694	0.6839	79
weighted avg	0.7376	0.7089	0.7067	79

Balanced Accuracy: 0.6694444444444446

Confusion Matrix:

```
[[20 0 1 0 3 0]
 [0 1 0 1 0 0]
 [1 0 3 0 0 0]
 [0 0 0 10 2 0]
 [8 0 2 4 21 0]
 [1 0 0 0 0 1]]
```



===== CV SUMMARY =====

precision recall f1-score support

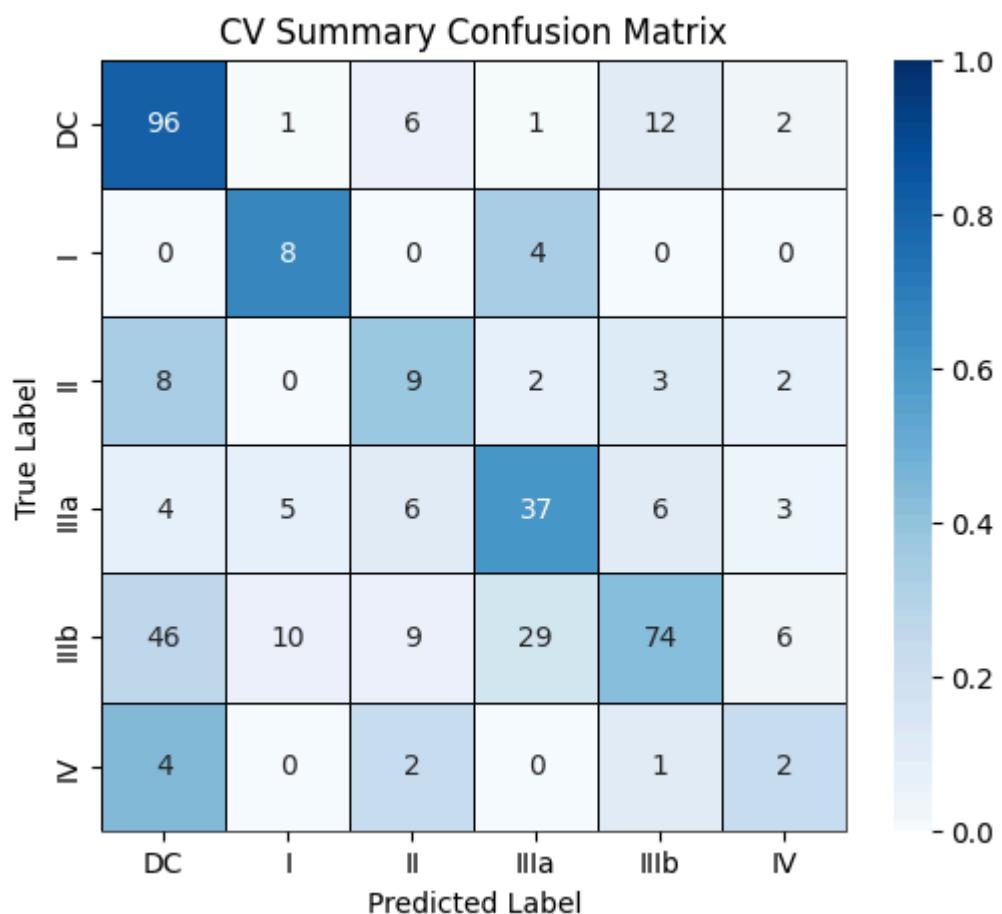
DC	0.6076	0.8136	0.6957	118
I	0.3333	0.6667	0.4444	12

II	0.2812	0.3750	0.3214	24
IIIa	0.5068	0.6066	0.5522	61
IIIb	0.7708	0.4253	0.5481	174
IV	0.1333	0.2222	0.1667	9
accuracy		0.5678	398	
macro avg	0.4389	0.5182	0.4548	398
weighted avg	0.6248	0.5678	0.5671	398

Balanced Accuracy: 0.5182154907156344

Confusion Matrix:

```
[[96 1 6 1 12 2]
 [0 8 0 4 0 0]
 [8 0 9 2 3 2]
 [4 5 6 37 6 3]
 [46 10 9 29 74 6]
 [4 0 2 0 1 2]]
```



===== REPEAT 5/5 =====

Starting 5-fold CV (3-train / 1-val / 1-test) on 398 samples...

===== Outer Fold 1 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']

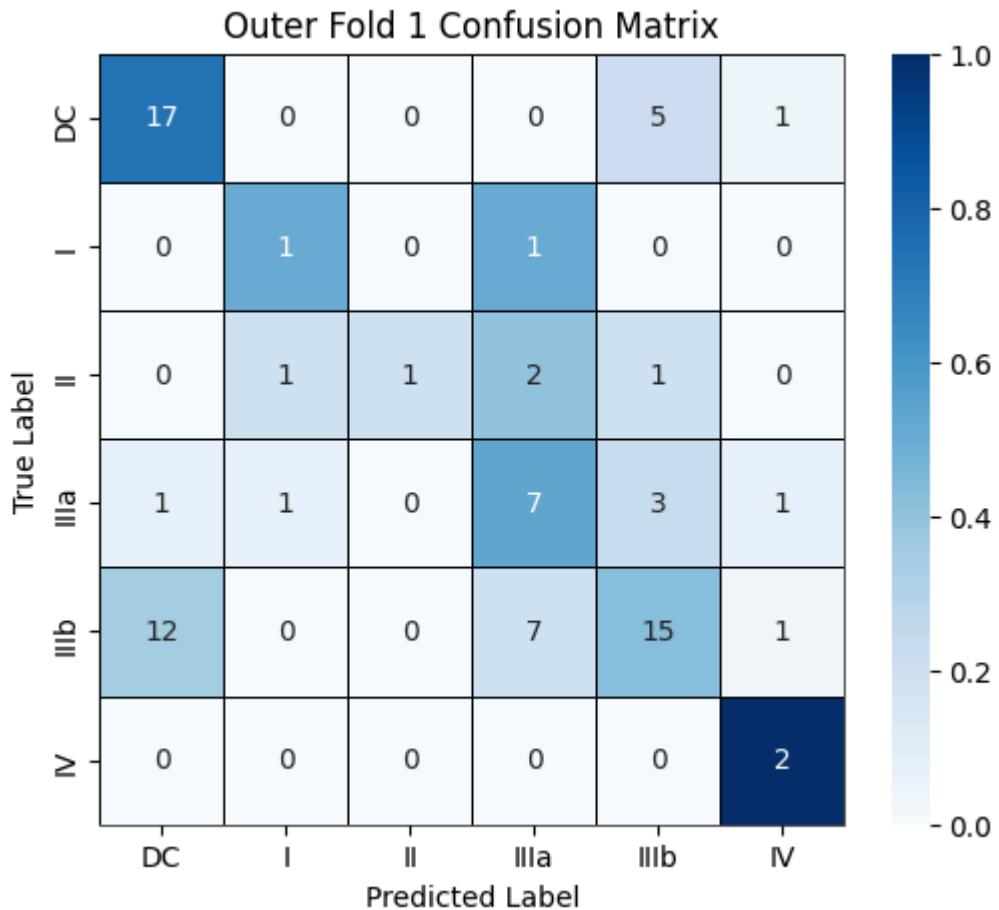
precision recall f1-score support

	DC	0.5667	0.7391	0.6415	23
I	0.3333	0.5000	0.4000	2	
II	1.0000	0.2000	0.3333	5	
IIIa	0.4118	0.5385	0.4667	13	
IIIb	0.6250	0.4286	0.5085	35	
IV	0.4000	1.0000	0.5714	2	
	accuracy		0.5375	80	
	macro avg	0.5561	0.5677	0.4869	80
	weighted avg	0.5841	0.5375	0.5278	80

Balanced Accuracy: 0.5676939003025959

Confusion Matrix:

```
[[17  0  0  0  5  1]
 [ 0  1  0  1  0  0]
 [ 0  1  1  2  1  0]
 [ 1  1  0  7  3  1]
 [12  0  0  7 15  1]
 [ 0  0  0  0  0  2]]
```



===== Outer Fold 2 =====

These features will be dropped:

['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'C127', 'C51', 'C135', 'C66']

precision recall f1-score support

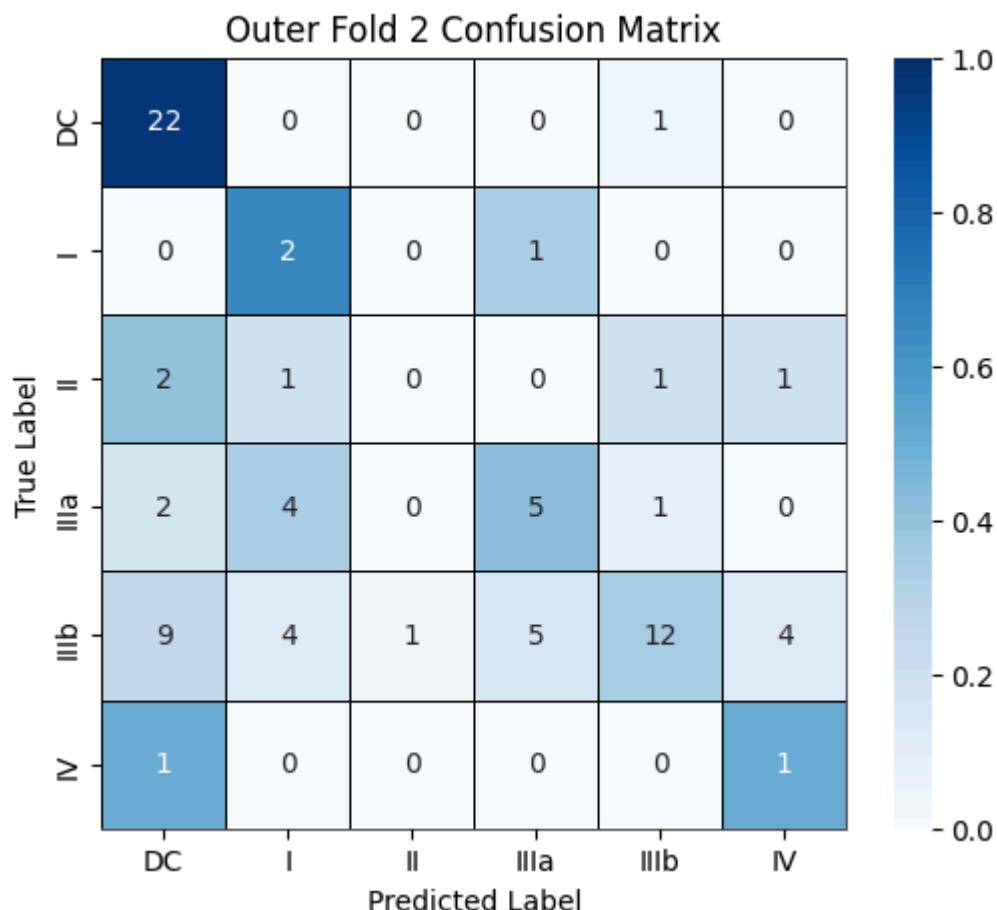
DC	0.6111	0.9565	0.7458	23
I	0.1818	0.6667	0.2857	3
II	0.0000	0.0000	0.0000	5
IIIa	0.4545	0.4167	0.4348	12
IIIb	0.8000	0.3429	0.4800	35
IV	0.1667	0.5000	0.2500	2
accuracy		0.5250	80	
macro avg	0.3690	0.4805	0.3660	80
weighted avg	0.6049	0.5250	0.5066	80

Balanced Accuracy: 0.4804520358868185

Confusion Matrix:

```
[[22 0 0 0 1 0]
 [0 2 0 1 0 0]
 [2 1 0 0 1 1]
 [2 4 0 5 1 0]]
```

```
[ 9  4  1  5 12  4]
[ 1  0  0  0  0  1]]
```



===== Outer Fold 3 =====

These features will be dropped:

```
['C11', 'C101', 'MC6. DP T cells', 'C64', 'C100', 'C126', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86',
'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.6250	0.8333	0.7143	24
I	0.7500	1.0000	0.8571	3
II	0.3333	0.4000	0.3636	5
IIIa	0.4000	0.6667	0.5000	12
IIIb	0.7692	0.2941	0.4255	34
IV	0.2000	0.5000	0.2857	2

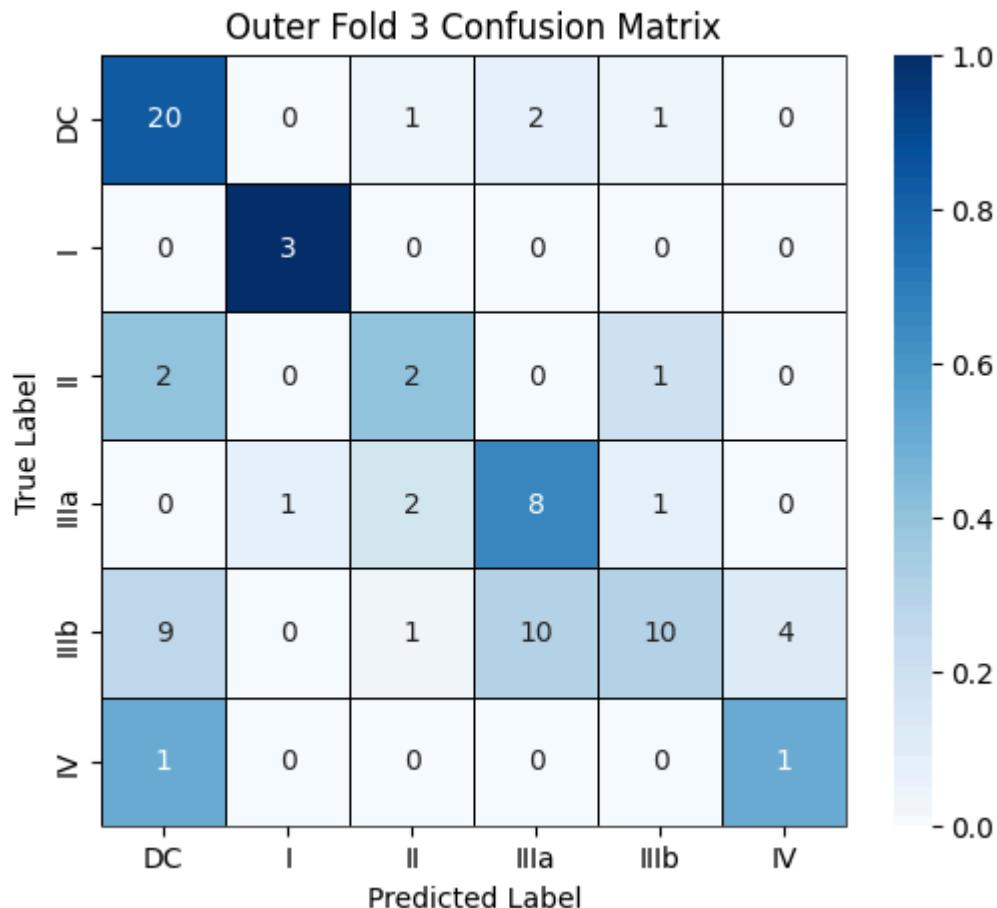
accuracy	0.5500	80		
macro avg	0.5129	0.6157	0.5244	80
weighted avg	0.6284	0.5500	0.5321	80

Balanced Accuracy: 0.6156862745098038

Confusion Matrix:

```
[[20  0  1  2  1  0]]
```

```
[ 0 3 0 0 0 0]
[ 2 0 2 0 1 0]
[ 0 1 2 8 1 0]
[ 9 0 1 10 10 4]
[ 1 0 0 0 0 1]]
```



===== Outer Fold 4 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40', 'C86', 'C92', 'C96', 'MC19. TD CD4+ T cells', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

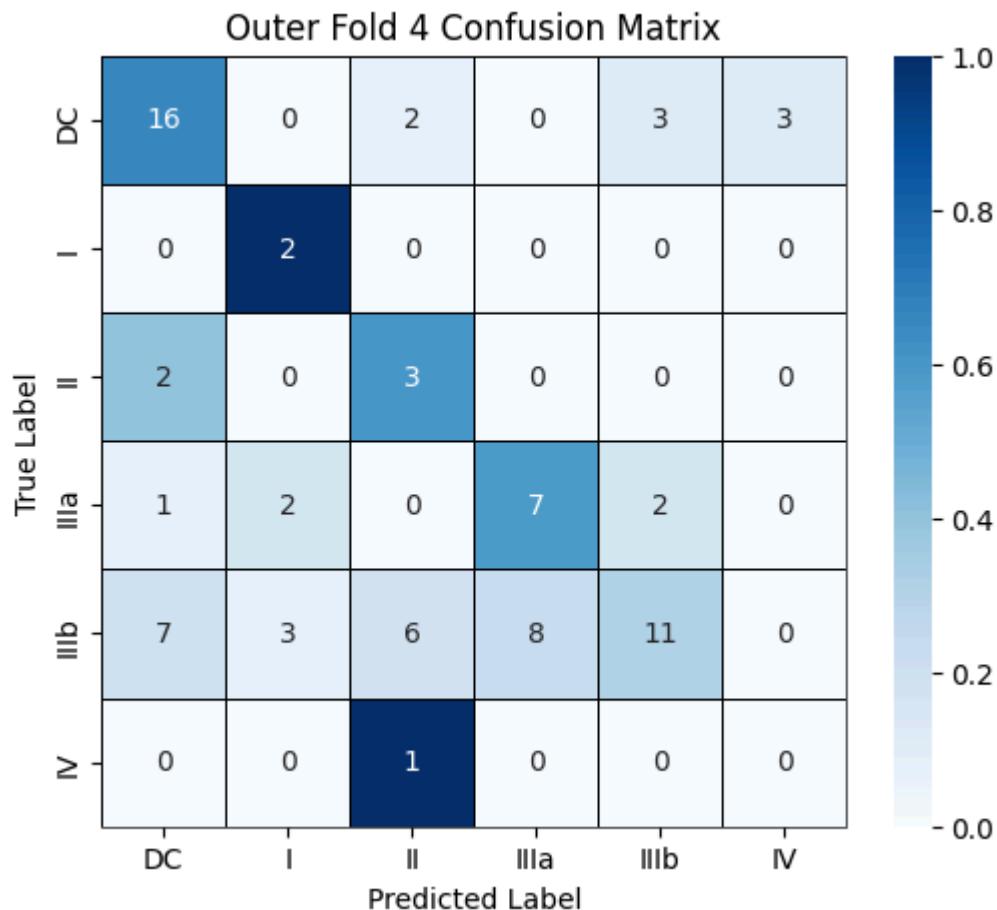
DC	0.6154	0.6667	0.6400	24
I	0.2857	1.0000	0.4444	2
II	0.2500	0.6000	0.3529	5
IIIa	0.4667	0.5833	0.5185	12
IIIb	0.6875	0.3143	0.4314	35
IV	0.0000	0.0000	0.0000	1

accuracy		0.4937		79
macro avg	0.3842	0.5274	0.3979	79
weighted avg	0.5855	0.4937	0.4979	79

Balanced Accuracy: 0.5273809523809524

Confusion Matrix:

```
[[16 0 2 0 3 3]
 [ 0 2 0 0 0 0]
 [ 2 0 3 0 0 0]
 [1 2 0 7 2 0]
 [7 3 6 8 11 0]
 [ 0 0 1 0 0 0]]
```



===== Outer Fold 5 =====

These features will be dropped:

```
['C11', 'C101', 'C64', 'C104', 'C100', 'C126', 'MC30. DN T cells', 'C82', 'C139', 'C85', 'C113', 'C87', 'C40',  
'C86', 'C92', 'MC28. PreGC B cells', 'C96', 'C127', 'C51', 'C135', 'C66']
```

precision recall f1-score support

DC	0.6786	0.7917	0.7308	24
I	0.5000	0.5000	0.5000	2
II	0.5000	0.2500	0.3333	4
IIIa	0.5294	0.7500	0.6207	12
IIIb	0.7586	0.6286	0.6875	35
IV	1.0000	0.5000	0.6667	2

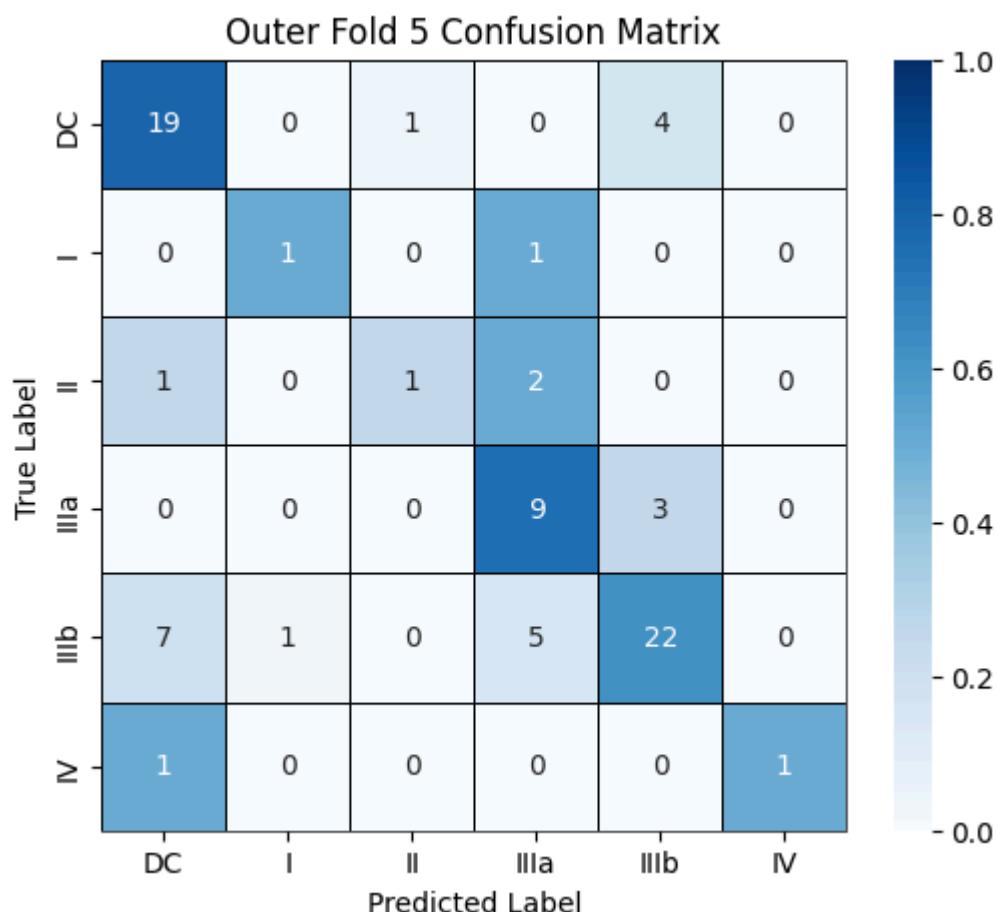
accuracy 0.6709 79

macro avg	0.6611	0.5700	0.5898	79
weighted avg	0.6860	0.6709	0.6673	79

Balanced Accuracy: 0.5700396825396825

Confusion Matrix:

```
[[19  0  1  0  4  0]
 [ 0  1  0  1  0  0]
 [ 1  0  1  2  0  0]
 [ 0  0  0  9  3  0]
 [ 7  1  0  5  22  0]
 [ 1  0  0  0  0  1]]
```



===== CV SUMMARY =====

	precision	recall	f1-score	support
--	-----------	--------	----------	---------

DC	0.6184	0.7966	0.6963	118
I	0.3333	0.7500	0.4615	12
II	0.3182	0.2917	0.3043	24
IIIa	0.4500	0.5902	0.5106	61
IIIb	0.7216	0.4023	0.5166	174
IV	0.2500	0.5556	0.3448	9

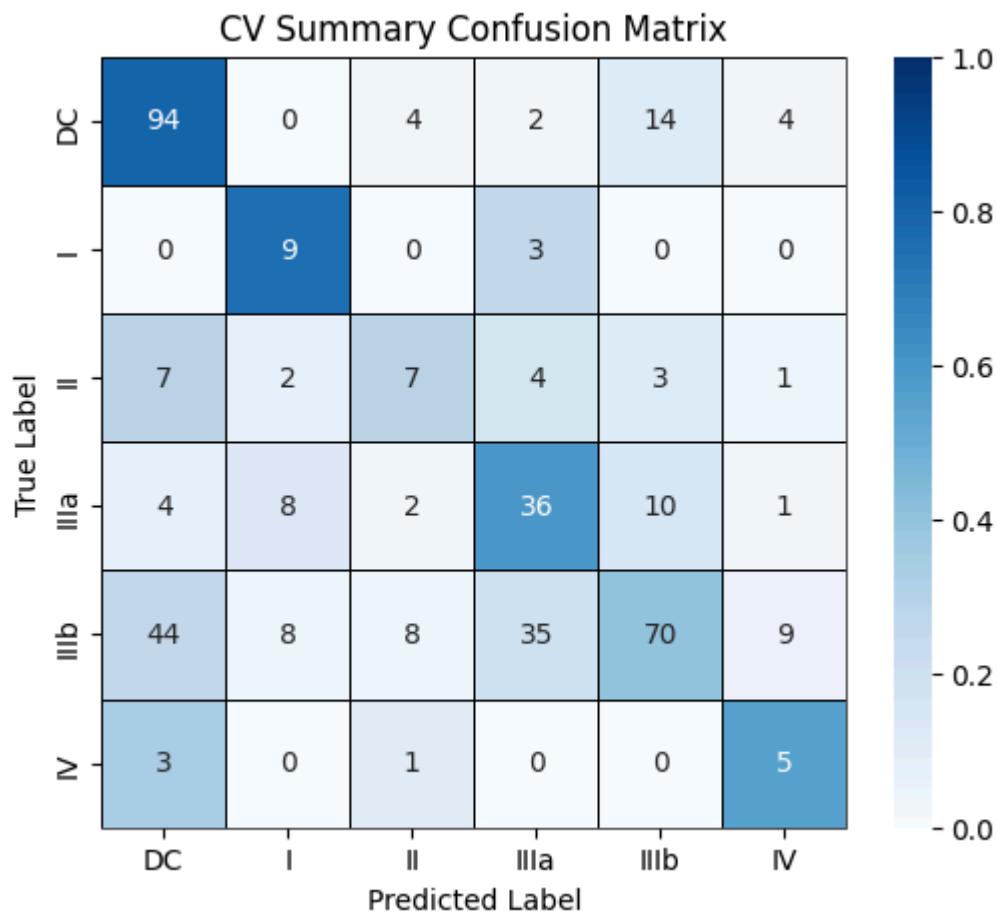
accuracy	0.5553	398
----------	--------	-----

macro avg	0.4486	0.5644	0.4724	398
weighted avg	0.6027	0.5553	0.5506	398

Balanced Accuracy: 0.5643825294524483

Confusion Matrix:

```
[[94 0 4 2 14 4]
 [0 9 0 3 0 0]
 [7 2 7 4 3 1]
 [4 8 2 36 10 1]
 [44 8 8 35 70 9]
 [3 0 1 0 0 5]]
```



===== FINAL SUMMARY =====

All balanced accuracies: [0.5130592496425678, 0.5324362397387951, 0.5710566153433426, 0.5182154907156344, 0.5643825294524483]

0.5398300249785576 ± 0.010614058574203096

```
params4 = {'units': 150, 'learning_rate': 0.01, 'dropout_rate': 0.5, 'num_hidden_layers': 1,
           'batch_size': 84, 'epochs': 88, 'l2_reg': 0.01, 'activation': "selu", 'optimizer': "sgd"}
```